

CRISTAL(-iSE) use in neuGRID and N4U

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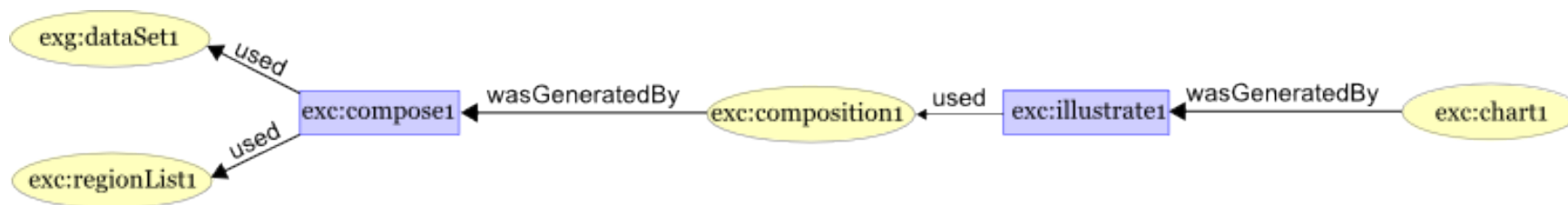
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- Provenance in CRISTAL
- The neuGRID Project
- The N4U Project
- The Analysis Suite
- Exporting to PROV

Provenance

- Definition :- The source or history of an object
- It is traditionally represented as a graph
- There are models today to capture provenance (OPM, PROV)
- Large W3C working group
- Hot topic these days

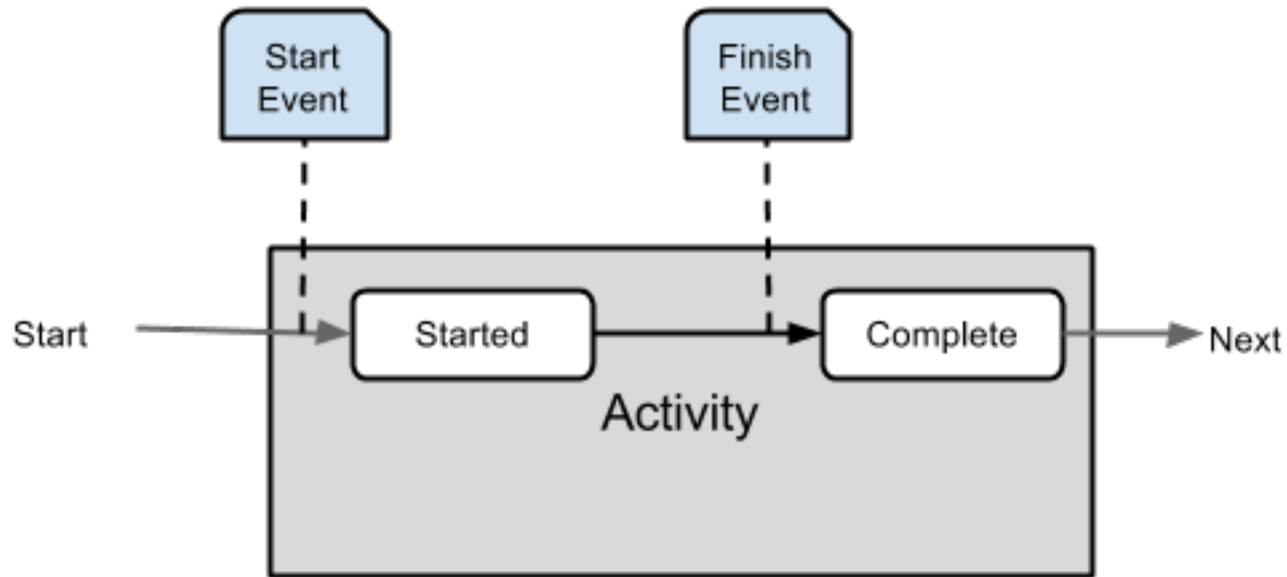
Provenance



Provenance in CRISTAL

- Event based model
- Strong Versioning Scheme
- Can record the 7 W's :Who, What, When, Where, Why, Which (w)How
- Differs from the “Semantic Web” view of Provenance
- Does not use a Linked Data interpretation

Provenance in CRISTAL



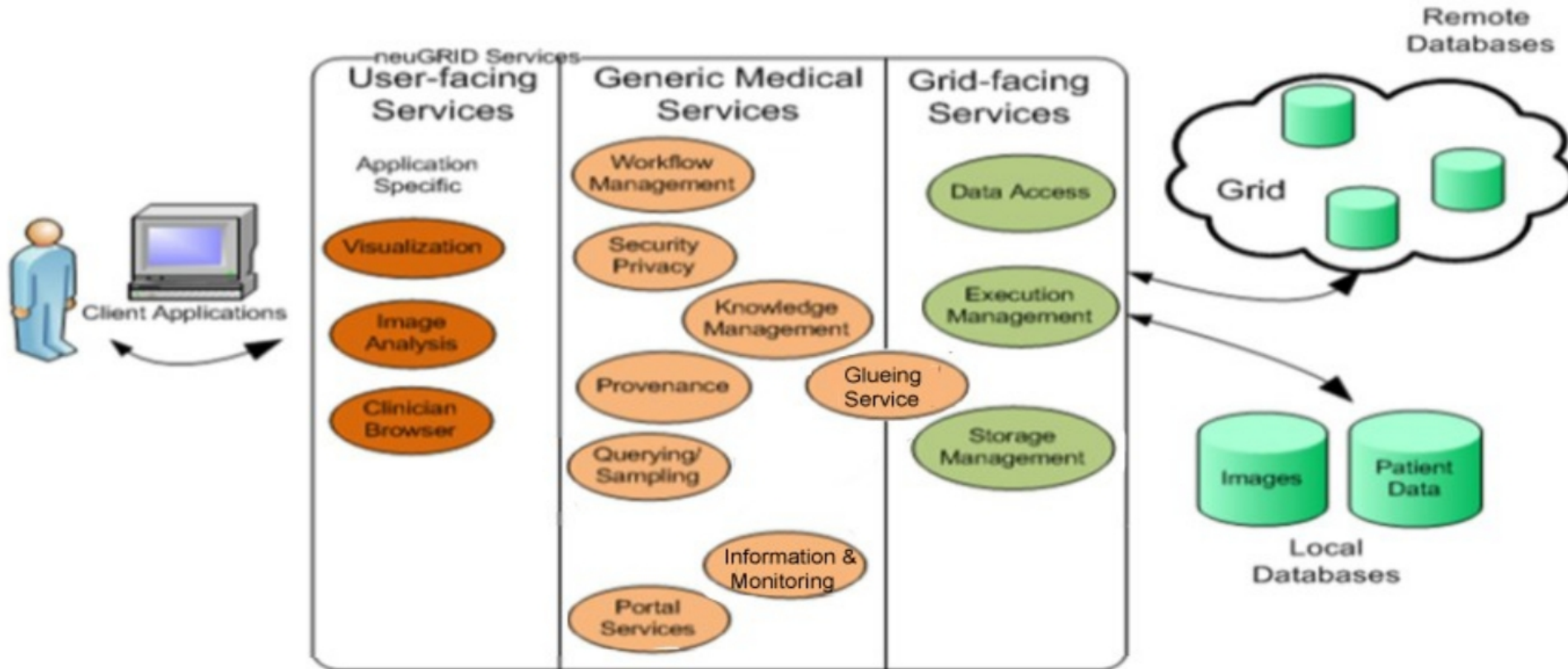
neuGRID

- Project started in late 2007
- Focus was on the analysis of Alzheimer's images
- FP7 Project
- Partners were : FBF, Prodemia, UWE, Maat-G, Vumc, KI, HeathGrid and CFc
- WP2, Requirements
- WP6 Distributed Medical Services Provision

neuGRID

- “Distrubuted Medical Service Provision”
- These were all defined as *Web Services*
- CRISTAL was used in WP6
- It was developed specifically for use the in the *Provenance Service*.
- Other services were : Pipeline Service, Glueing Service, Querying Service, Portal Service and Pseudonymisation Service

neuGRID



neuGRID – Provenance Service

- The provenance service, captured *Workflow Provenance*.
- It was able to capture :
 - Pipeline Specifications
 - Data or inputs supplied to each pipeline component
 - Annotations added to the pipeline and individual pipeline components
 - Links and dependencies between pipeline components
 - Execution errors generated during analyses
 - The output produced by the pipeline and each pipeline component

neuGRID – Provenance Service

- The Provenance Service was based on an *older* version of CRISTAL
- Here CRISTAL was used for the orchestration of the analyses as well as provenance capture
- The provenance was all stored in an RDMS

N4U

- Follow on project from neuGRID
- Currently ongoing
- UWE leading two *Research WPs*
- WP9 – Data Atlas
- WP10 – Analysis Service

N4U – Data Atlas

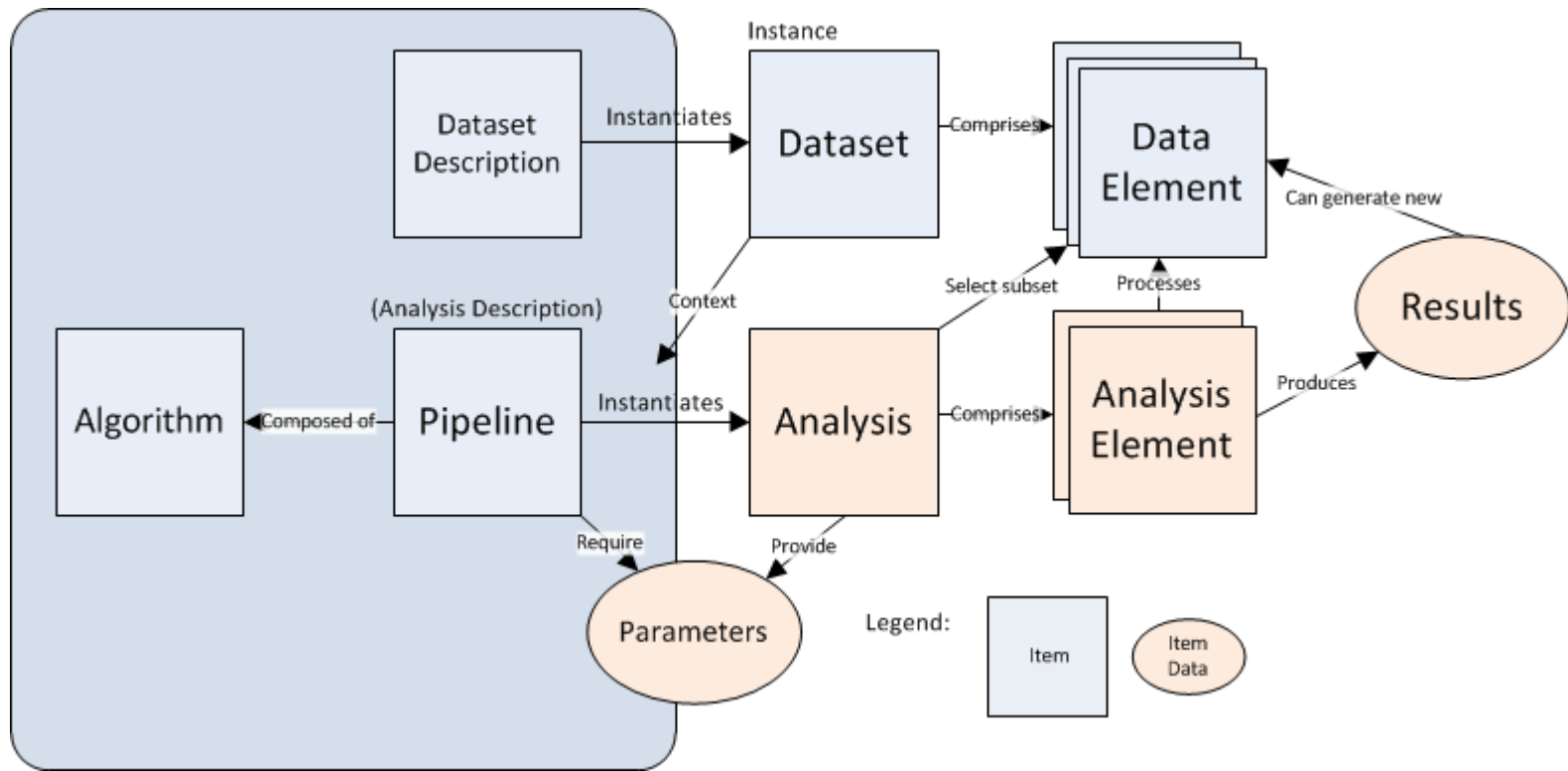
- Objectives :-

- To develop the 'data atlas' to index all external data and pipeline definitions, with their associated provenance as required by the end-user community following the definition in the N4U user requirements.
- To design and implement advanced query/persistency services on top of this data atlas to enable users to access sets of data and images resident in the system infrastructure, as defined by the N4U user requirements.
- To work with each external data provider in defining what they need to export into the data atlas in order to fulfil the N4U user requirements.
- To provide an enhanced OPM-compliant provenance management service to enable users to capture dataset definitions, pipeline execution outcomes, information and knowledge derived from individuals' analyses.

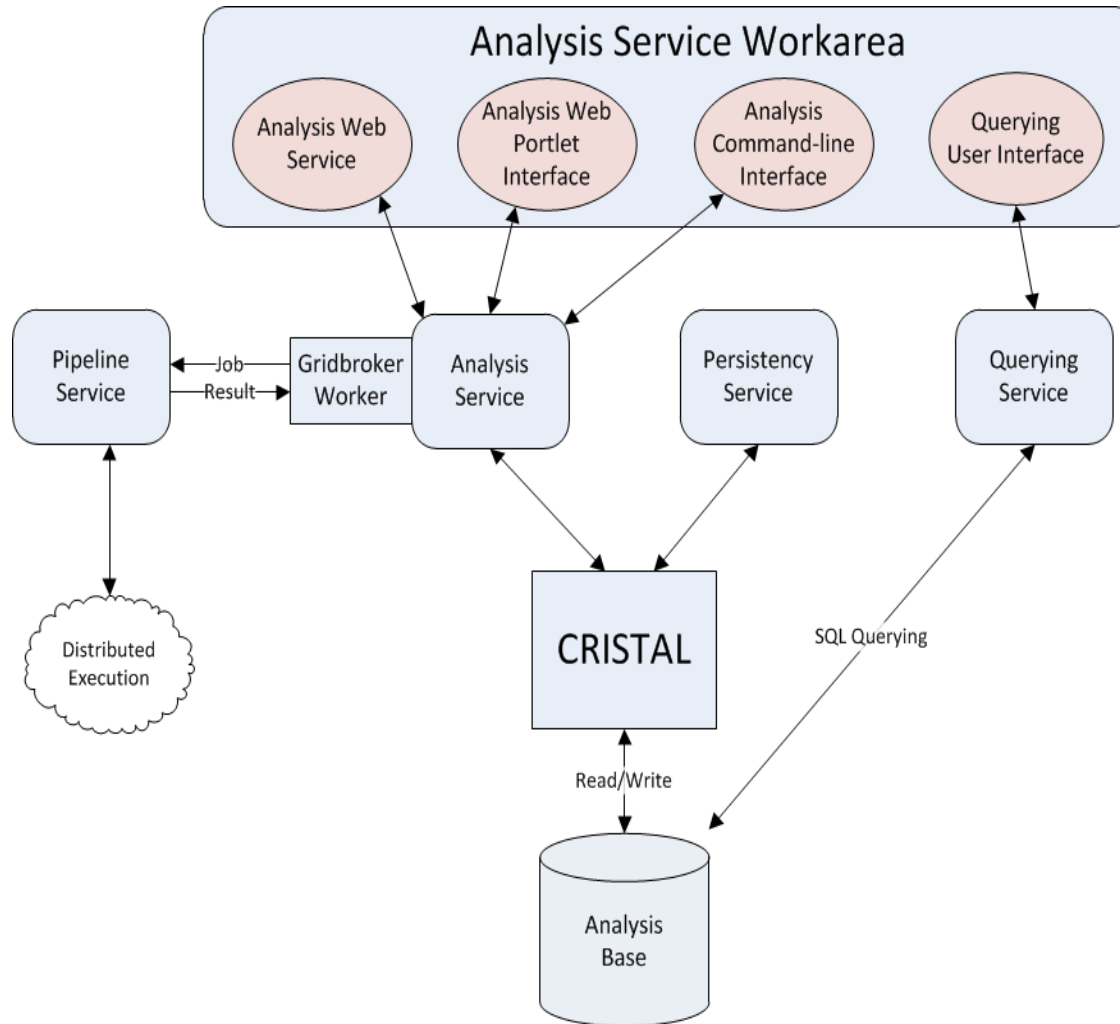
N4U – Analysis Services

- Objectives :-
 - To provide customisable (according to user role) environment in which users can conduct their specific neuroscience analyses using the Provenance and Persistency Services (the WP9 Information Services) and DCI Pipeline service (from WP5) in the neuGRID infrastructure.
 - To ensure that the underlying complexities of the neuGRID infrastructure and middleware services are hidden from the user but access is provided to their functionality by interfacing with underlying DCI APIs.
 - To enable access to the WP8 (Science Gateway) services through personalised interfaces, configured according to the role and access rights of the users.

N4U – CRISTAL Model



N4U – Service Set



N4U – Persistency Service

- Data is “pushed” directly into a custom N4U instance
- There are schemas setup which can handle nearly any data type
- This demonstrates the *flexibility* of CRISTAL

N4U – Analysis Web Service

- Apache CXF Web Service
- Connects directly to CRISTAL instance via CORBA
- Is a simple web service which has basic methods for creating an analysis
- Is an interface for “expert” users

N4U – Analysis Web Service

- **createAnalysis(pipelineID)** - This is for a user to create a *new* analysis from an existing pipeline. The input parameter is the ID for the pipeline and the return type is an Analysis ID.
- **startAnalysis(int analysisID)** - This starts an already created analysis in the past. Here the input is the Analysis ID and the output is the job id of the running analysis if successfully started or an error message
- **queryAnalysis(int analysisID)** - This allows the user query the current state of an analysis. Here the output would be the current state of analysis with the analysis ID as the input.
- **abortAnalysis(int analysisID)** - This will allow a user to start/stop an already running Analysis. It will return a boolean value stating if the abort was successful.

N4U – Analysis CLI client



neuGRID
N4U (neuGRID for you)

HOME LAUNCH ANALYSIS PIPELINES VIRTUAL LABORATORY EXTERNAL PORTALS INFRASTRUCTURE HELP DESK

```
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
Adding resource URL for dev: jar:file:/opt/crystal-client/lib/crystal-dev-0.6.jar!/uk/ac/uew/crystaldev/resources/
Adding resource URL for gui: jar:file:/opt/crystal-client/lib/crystal-gui-2.4.jar!/com/ckernel/gui/resources/
Adding resource URL for n4u: jar:file:/opt/crystal-client/lib/crystal-n4u-0.8-SNAPSHOT.jar!/uk/ac/uew/neuGRID/resources/
Connected to N4U Analysis Service at jetend:shamdasani@cern.ch
Connected to proxy server on prod.cctw.uew.ac.uk:1553
NG> statusAll()
Analysis nG+FreeSurfer+5.3.0+ReconAll+v01.OASIS_1395321866573 contains 1 elements, 1 are complete (100%)
  - Element nG+FreeSurfer+5.3.0+ReconAll+v01.OASIS_1395321866573+ng+OASIS+OAS10001MR1+ITS+MPR-ORIG-V01.nii.bz2: Finished since 2014-04-01 13:13:06
Analysis nG+FreeSurfer+5.3.0+ReconAll+v01.OASIS_1395327857682 contains 1 elements, 1 are complete (100%)
  - Element nG+FreeSurfer+5.3.0+ReconAll+v01.OASIS_1395327857682+ng+OASIS+OAS10001MR1+ITS+MPR-ORIG-V01.nii.bz2: Finished since 2014-03-31 16:14:18
Analysis nG+FreeSurfer+5.2.0+ReconAll+v01.OASIS_1399907611395 contains 2 elements, 0 are complete (0%)
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  - Element nG+FreeSurfer+5.2.0+ReconAll+v01.OASIS_1399907611395+ng+OASIS+OAS10001MR1+ITS+MPR-ORIG-V02.nii.bz2: SUBMISSION FAILED since 2014-05-12 16:15:52
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403013781159 is empty or not yet initialized
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403013812624 is empty or not yet initialized
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403014694561 is empty or not yet initialized
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403015031361 is empty or not yet initialized
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403015533869 is empty or not yet initialized
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403018006569 contains 2 elements, 0 are complete (0%)
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  - Element nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403018006569+ng+OASIS+OAS10001MR1+ITS+MPR-ORIG-V02.nii.bz2: Running since 2014-06-17 16:12:07
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  - Element nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403018216286+ng+OASIS+OAS10002MR1+ITS+MPR-ORIG-V02.nii.bz2: Running since 2014-06-17 16:15:36
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  - Element nG+FSL+5.0.1+FirstHippo+v01.OASIS_140360717673+ng+OASIS+OAS10002MR1+ITS+MPR-ORIG-V02.nii.bz2: Running since 2014-06-24 11:50:32
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403607414070 contains 2 elements, 0 are complete (0%)
  - Element nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403607414070+ng+OASIS+OAS10001MR1+ITS+MPR-ORIG-V01.nii.bz2: Running since 2014-06-24 11:55:26
  - Element nG+FSL+5.0.1+FirstHippo+v01.OASIS_1403607414070+ng+OASIS+OAS10002MR1+ITS+MPR-ORIG-V02.nii.bz2: Running since 2014-06-24 11:55:28
Analysis nG+FSL+5.0.1+FirstHippo+v01.OASIS_140360744263 contains 2 elements, 0 are complete (0%)
```

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CRISTAL use in neuGRID/N4U



N4U – Analysis CLI client

- A command line interface to launch Analyses
- Supports running scripts from the command line
- Allows dataset/pipeline selection

N4U – Portlet GUI(s)

- Two GUIs
- Submission Portlet
- Status Portlet
- Uses the Analysis Core as a backend

N4U – Portlets

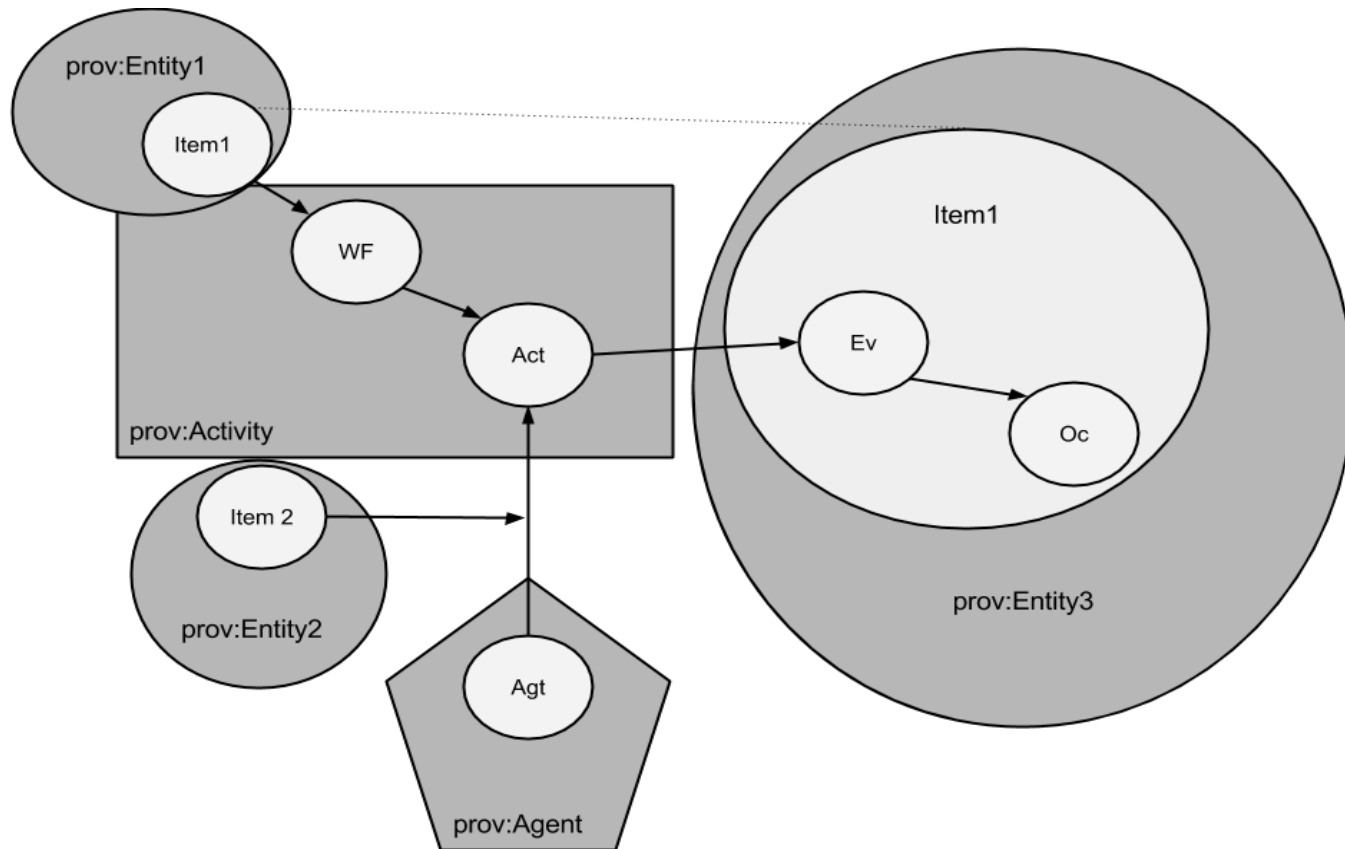
- Demo



N4U – PROV Export

- PROV : WC3 Standard to represent Provenance
- CRISTAL2PROV : work underway!
- Definition of mapping patterns

N4U – PROV Export



Fin.



CRISTAL use in neuGRID/N4U

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