Workshop on the Theory and Practice of Provenance 2011

Challenges in managing implicit and abstract provenance data: experiences with ProvManager

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Problem/Motivation

- Some challenges in managing provenance
  - Which provenance data should be gathered?
    - Open Provenance Model is a possible solution
  - How to capture provenance data?
    - Three levels: Workflow, Operating System, Activity
  - How to manage provenance in workflows that are executed by different execution environments (distributed environments)?

ProvManager - Overview of provenance gathering strategy

[SWF 2009; IPAW, 2010]

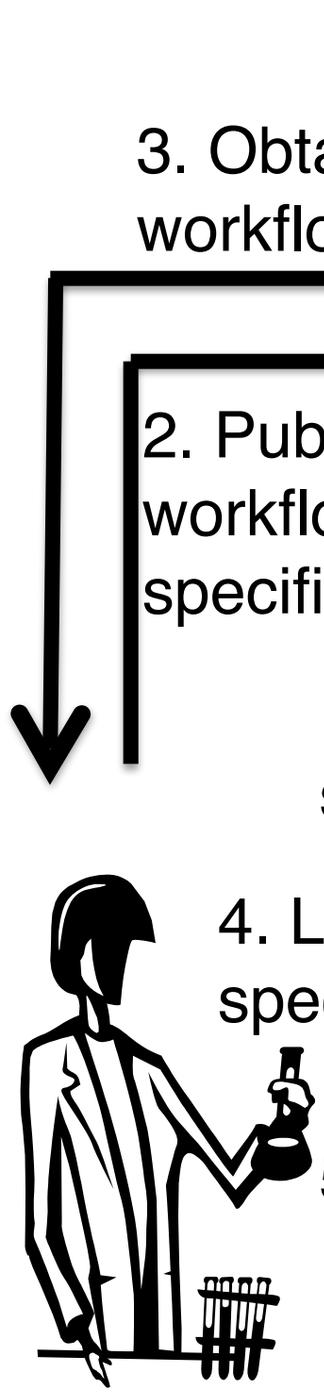
3. Obtain the adapted workflow specifications

2. Publish the workflow specifications

1. Collect the workflow specifications from SWfMS

4. Load the adapted workflow specifications in the SWfMS

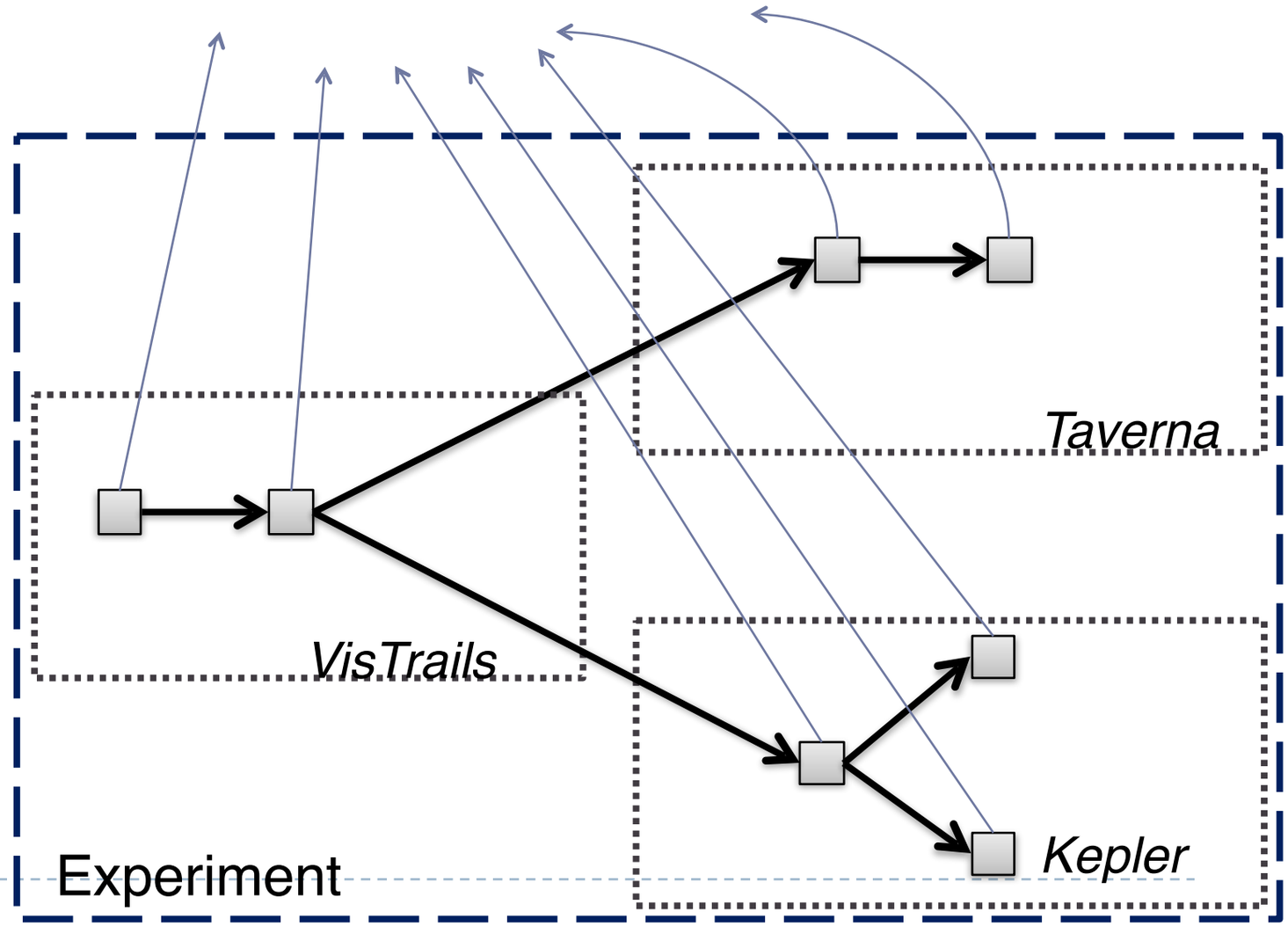
5. Run



Scientist

ProvManager

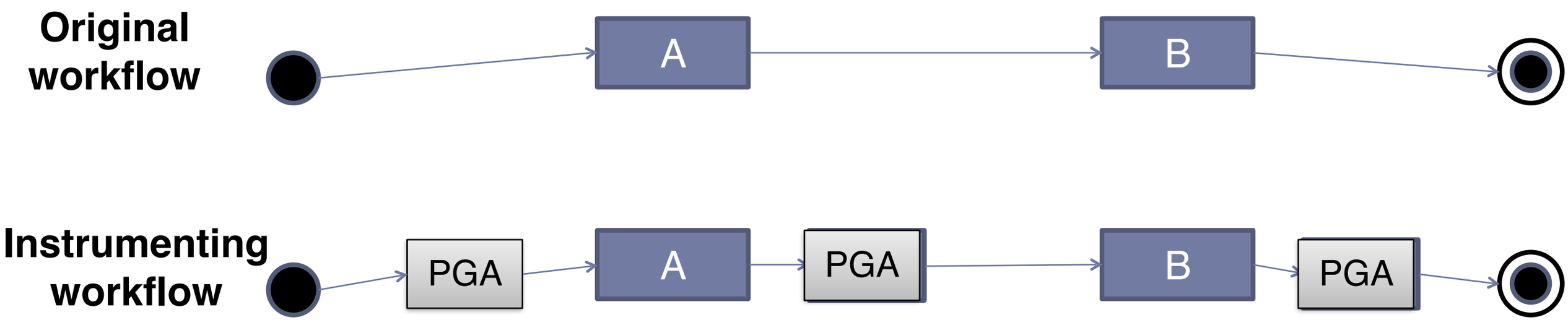
6. Provenance data sent by the activities



Workflow instrumentation

Original workflow

Workflow instrumentation

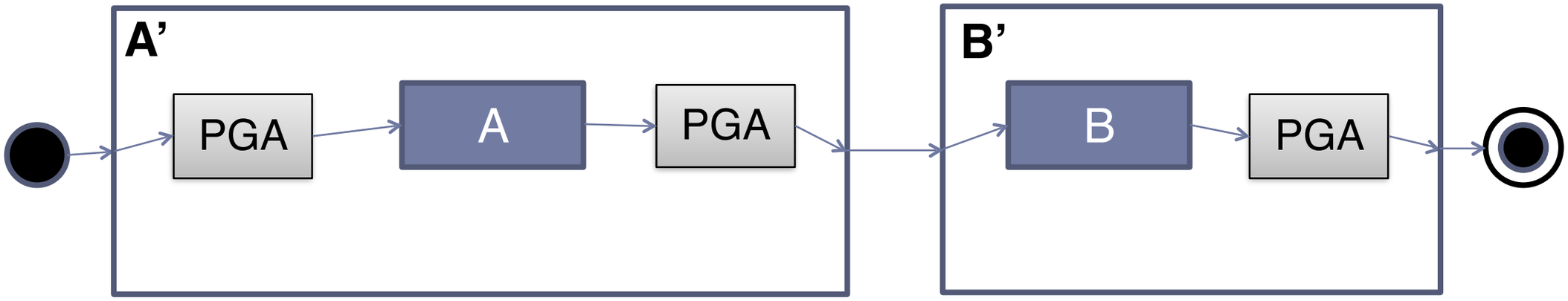


Workflow instrumentation

Original workflow

Instrumenting workflow

Wrapping activities

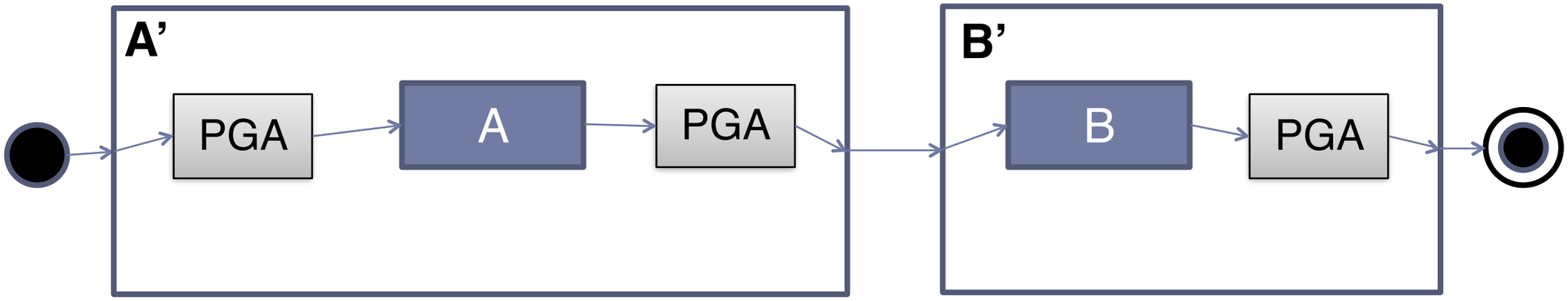


Workflow instrumentation

Original workflow

Instrumenting workflow

Wrapping activities



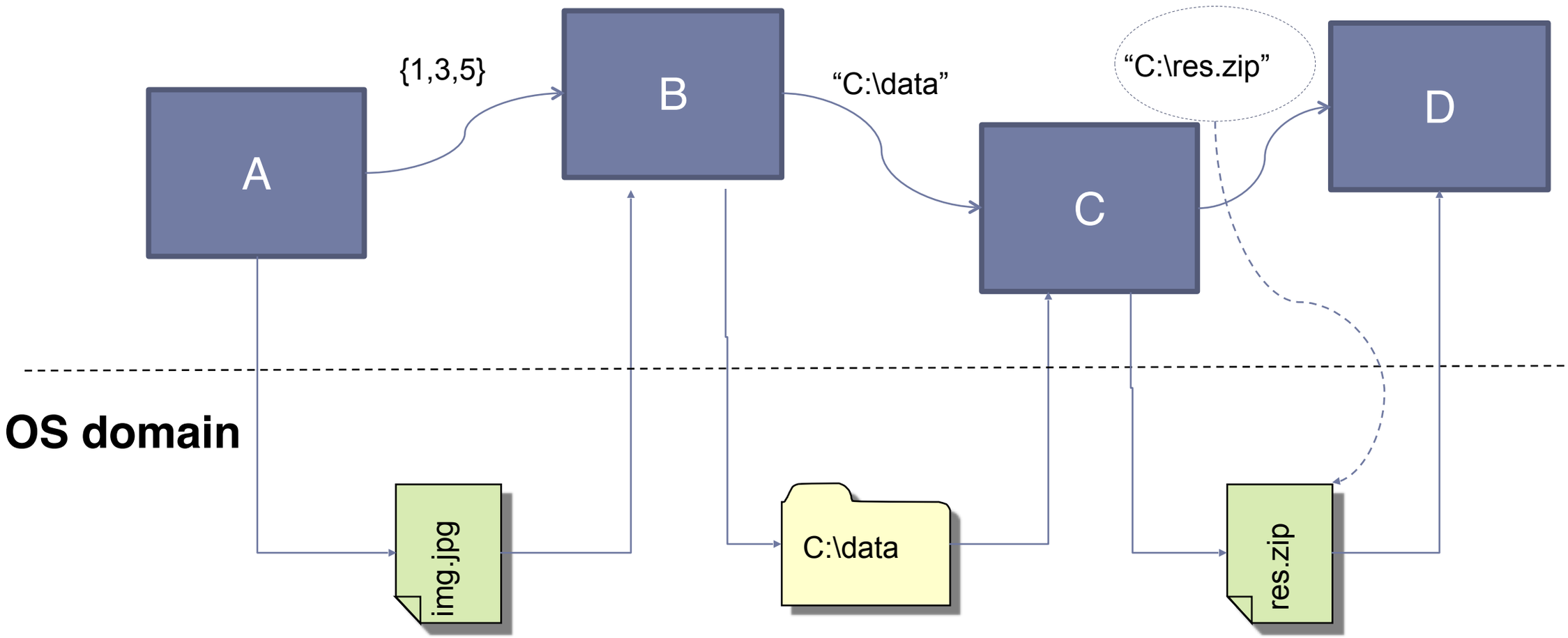
Adapted workflow

There are still some problems…

- Implicit provenance data
  - Difficulty in gathering provenance data when these are not explicitly declared in the workflow specification
- Lack of higher provenance abstraction levels
  - Concrete workflow related provenance data are not enough to help scientists in the experiment analysis
    - Some scientists may not be used to such information

Implicit provenance data

SWfMS domain



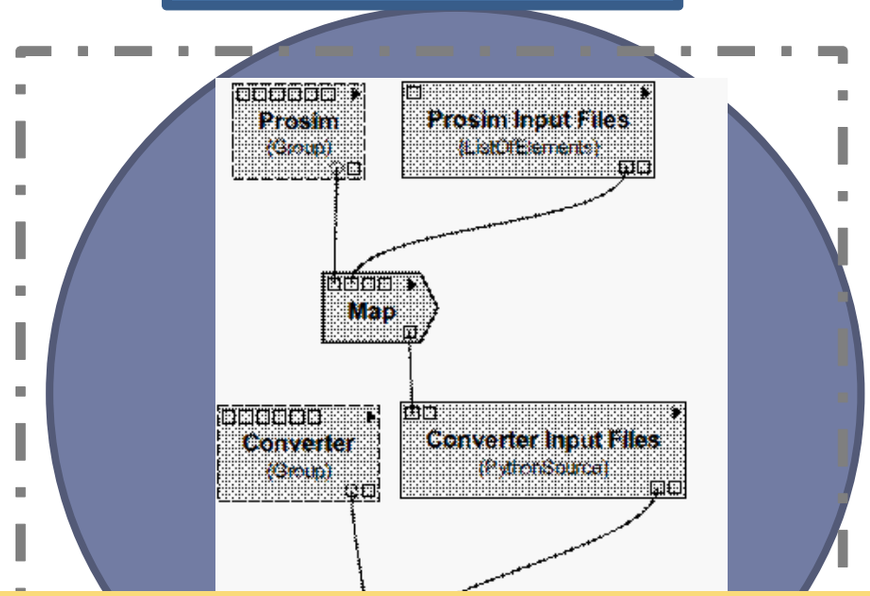
OS domain

Lack of higher provenance abstraction levels

Conceptual

Abstract

Concrete



Problem: scientist does not easily relate data from one abstraction level to the other

Questions such as “what is the result data of the ‘analysis of platform movements’ activity?” can not be easily answered

Some ideas…

- Implicit data
  - Adopt a OS level provenance gathering mechanism to work together with the PGA in the ProvManager
  - There is a similar initiative in VisTrails (Koop et al. (2010))
- Lack of higher provenance abstraction levels
  - Create a “conceptual provenance data” model
    - Salayandia and da Silva (2010) propose something similar
  - Map this model to the existing “concrete provenance data”

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