Quantitatively Understanding Workflow Performance using `prov:Bundle`

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The notebook is the place where all primary data must be recorded. Paper towels, napkins, toilet tissue, or scratch paper have a tendency to become lost or destroyed. It is a bad practice to record primary data on such random and perishable pieces of paper. [1]

CONCEPT

- Yes even 40 years later[1] non-traditional forms of provenance are still very prevalent!
- Using non-traditional forms may be motivated by
  - legacy practices
  - Innovation
    - Allowing new ways to analyze and explain data origin, process history
    - Providing efficiency in the way provenance can be stored and managed.

NEW IDEAS

•`Prov:Bundle` recognizes the co-existence of non-traditional forms of provenance with PROV:

- Supports provenance of provenance: Provides the means to associate different kinds of provenance as an object to PROV graphs.

•Definition offers some flexibility, *leaving it open to different interpretations*…Provenance of Provenance as a(n):

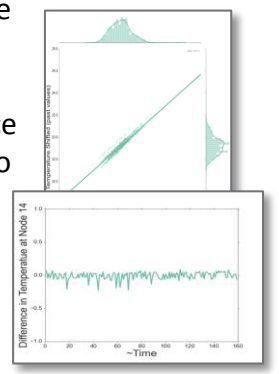
- Native source provenance `dcat:Dataset`
- Subset persisted in an external store.
- Algorithm

IMPACT

- Including additional crucial historical facts even in non-traditional forms, help explain results.
- Technical barriers can be reduced in extreme scale applications by introducing innovative approaches to provenance representation.
- Raw chain of custody evidence or domain oriented provenance in addition to PROV benefits consumers.
- Audit trails associated with provenance can help identify personal data For example, fingerprinting an integral part of provenance and needs to be managed.

MOTIVATION

- Native source: Earth system modelers compile case study provenance information into their application as a dataset.
- Hybridization: Studying workflow performance by streaming time-series metrics correlated to workflow provenance to effects of workflow task
- Using empirical data collected from provenance and metrics to support adhoc decisions made by trained algorithms.



[1] Pavia, Donald L. Lampman, Gary M. Kriz, George S. Donald L. Pavia, Gary M. Lampman, and George S. Kriz. Introduction to organic laboratory techniques: a contemporary approach. 1976.