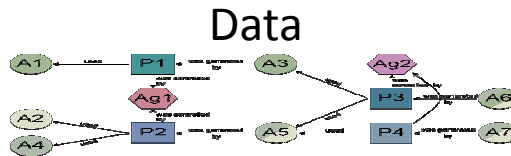


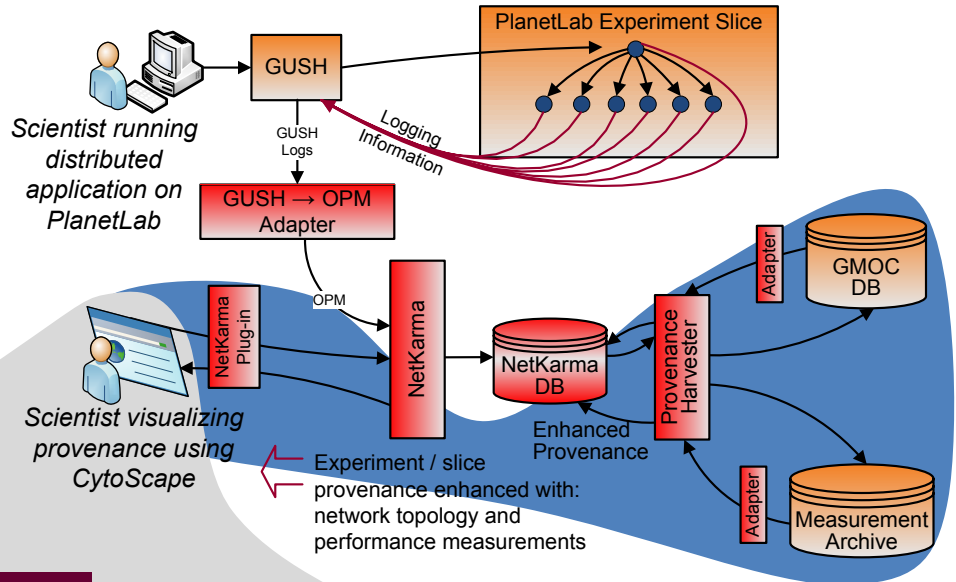
Experiment Provenance: Towards Links to Network Measurement



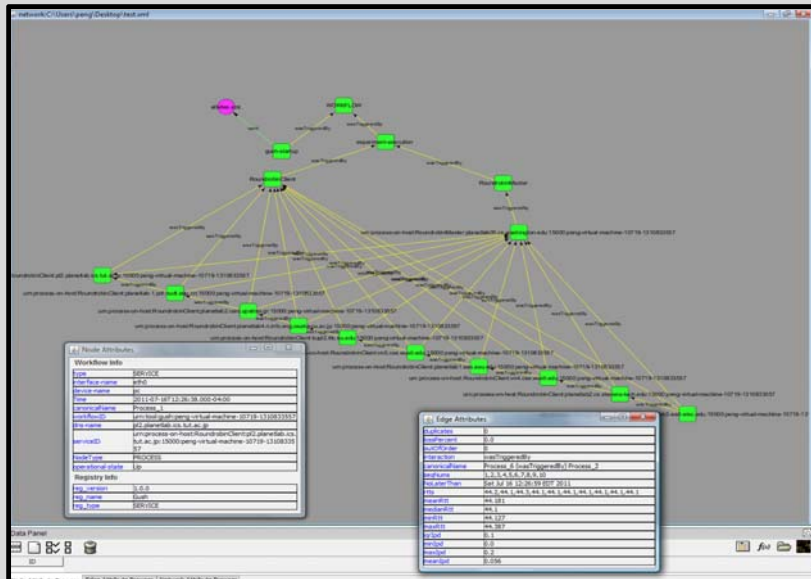
Objective

- Show that the experiment provenance and network measurement data can be linked together.
 - Collect experiment provenance from a distributed message passing application executed through GUSH.
 - Experiment provenance is gathered from GUSH and stored to the netKarma repository.
 - Harvest the GMOC Database and I&M Measurement Archive for provenance and store it to netKarma repository.
- Export provenance as Open Provenance Model (OPM) based XML graph files made available to the community.
- Visualize enhanced provenance information using CytoScape tool.

Provenance Capture from Multiple Sources



Visualization of Provenance



Recent Features

- ✓ Collect GENI experiment log files through NetKarma website.
- ✓ Capture provenance of the experiments run by GUSH in GENI.
- ✓ Rollout NetKarma Provenance Repository containing data from a variety of experiment log files.
- ✓ Capture the workflow of GENI slice creation, topology of the slice, operational status, and other measurement statistics and correlate it with the provenance data for an experiment / slice.
- ✓ Export provenance as an Open Provenance Model (OPM) XML graph file made available to the community.
- ✓ Visualize provenance information using CytoScape tool.

Harvesting Network Topology & Measurement Archive

- Periodically, the NetKarma database is queried for the provenance of new experiments / slices that have not yet been annotated with topology and measurement information.
- Based on the nodes in the provenance graph, the GMOC database is queried for topology information, that is converted to annotations through a NetKarma adapter.
- Based on the edges in the provenance graph, limited measurement data is harvested from the measurement archive and added as annotations in the provenance graph through a NetKarma adapter.
- The provenance data, enhanced with topology and measurement data, can be visualized by experimenters using a NetKarma plug-in for the CytoScape visualization tool.

Future Directions

- ❑ Enable researchers to see the exact state of the network activity by linking to network measurement data from experiment provenance.
- ❑ Linking experiment / slice provenance to network measurement data to explain network measurement activity.

References

- Simmhan, Y.L., Plale, B., and Gannon, D., Karma2: Provenance Management for Data-Driven Workflows, International Journal of Web Services Research, 5(2): 1-22, 2008.
- The Open Provenance Model (v1.01), <http://eprints.ecs.soton.ac.uk/16148/1/opm-v1.01.pdf>.