# Probe-It! Visualization Improvements

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## ABSTRACT

Probe-It! is a provenance visualization tool used to help scientists understand the results they generate. However, without the proper tools through a well-designed user interface, this task could be made very difficult to accomplish. Probe-It! uses proofs and several different views to help the scientist understand how the result was generated. In a continual effort to help scientists inspect their scientific data, Probe-It! has received improvements to the way it visualizes this information. This work describes the Improvements that Probe-It! has received.

## VISUALIZATION IMPROVEMENTS

- **Probe-It** has had a few improvements that have made the navigation of the query and justification view easier.
- The query view now has the ability to show all the sources used to generate a particular result.
- The justification view can now be represented as a Directed Acyclic Graph (DAG, Figure 4).
- The justification view allows the user to zoom in/out and navigate the justification view by clicking and dragging the canvas (panning).
- **Probe-It!** will receive a new addition that will allow users to see alternate justifications.

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## BACKGROUND

- **Probe-It** is a browser suited for graphically rendering provenance information associated with results coming from inference engines and workflows.
- **Probe-It** does not actually generate content (i.e., logging or capturing provenance information).
- Provenance generated from small workflows can become large and incomprehensible as a whole. **Probe-It** consists of a multitude of viewers, each suited to different elements of provenance.
- **Probe-It** consists of four primary views to accommodate the different kinds of provenance information.
  - queries (requests)
  - results (final and intermediate data)
  - global justifications (further referenced as justification view, displays description/explanation of the generation process)
  - local justifications (information about the sources (i.e., execution traces))
- The query view (Figure 2) shows results of queries which may include requests for generation of artifacts, similarly to how a Web search engine presents search results.
- The global justification view (Figure 3) is a complimentary view that contains all the process meta-information associated with the execution trace, such as the functions invoked by the workflow, and the sequencing associated with these invocations. **Probe-It** renders this information as a graph (Figure 1), which shows how an answer was generated.

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## SUMMARY

This work describes modifications to **Probe-It!**'s interface to improve visualization. **Probe-It!**'s Improvements include the summarization of PMI (Proof Markup Language) sources, the capability of rendering justifications as DAtG (in addition to the tree style), the capability of navigating through the proof by panning, and the upcoming feature of rendering alternate justifications. **Probe-It!**, the visualization of provenance, and the analysis of trust-data have now been made a user-friendly environment.

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## REFERENCES


