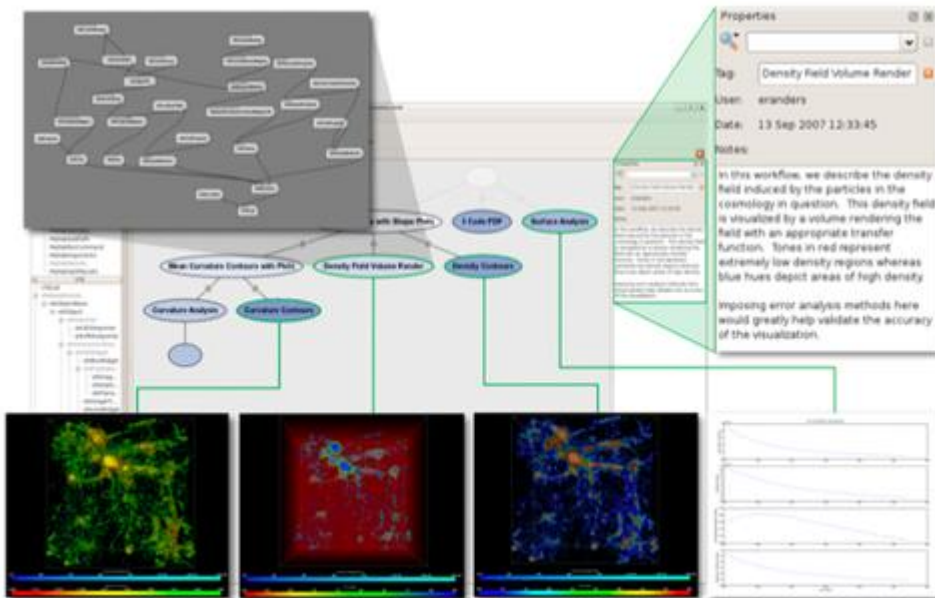


VisTrails Training Workflow



VisTrails is an open-source scientific workflow and provenance management system that provides support for simulations, data exploration and visualization. Whereas workflows have been traditionally used to automate repetitive tasks, for applications that are exploratory in nature, such as simulations, data analysis and visualization, very little is repeated---change is the norm. As an engineer or scientist generates and evaluates hypotheses about data under study, a series of different, albeit related, workflows are created while a workflow is adjusted in an interactive process. VisTrails was designed to manage these rapidly-evolving workflows.

A key distinguishing feature of VisTrails is a comprehensive provenance infrastructure that maintains detailed history information about the steps followed and data derived in the course of an exploratory task: VisTrails maintains provenance of data products, of the workflows that derive these products and their executions. This information is persisted as XML files or in a relational database, and it allows users to navigate workflow versions in an intuitive way, to undo changes but not lose any results, to visually compare different workflows and their results, and to examine the actions that led to a result. It also enables a series operations and user interfaces that simplify workflow design and use, including the ability to create and refine workflows by analogy and to query workflows by example.

VisTrails supports the creation and execution of workflows. It allows the combination of loosely-coupled resources, specialized libraries, grid and Web services. The released version comes with support for several packages including, [VTK](#), [Image Magick](#), Web Services, and [pylab](#). You can also download [packages contributed by our users](#), as well as [create your own packages/modules](#). There are also a number of [projects extending or building on top of VisTrails](#). Workflows can be run interactively, through the VisTrails GUI, or in batch using a VisTrails server.

VisTrails 1.0 was released in October 2007. Since then, the system has been downloaded thousands of times. VisTrails is written in Python and it uses the multi-platform Qt library for its user interface. It runs on Mac, Linux and Windows. You can download VisTrails from <http://www.vistrails.org/index.php/Downloads>

Publishing Reproducible Results

VisTrails 2.0 allows the inclusion of reproducible results in LaTeX/PDF documents. We provide a LaTeX package that allows users to add links to their results in the LaTeX source. For example:

```
\usepackage{vistrails}
```

```
...
```

```
\begin{figure}
```

```
\begin{center}
```

```
\subfigure[a=0.9]{\vistrail[filename=alps.vt, version=2, pdf]{width=8cm}}
```

```
\subfigure[a=0.9]{\vistrail[filename=alps.vt, version=11, pdf,buildalways]{width=8cm}}
```

```
\caption{A figure produced by an ALPS VisTrails workflow. Clicking the figure retrieves the workflow used to create it. Opening that workflow on a machine with VisTrails and ALPS installed lets the reader execute the full calculation.}
```

```
\end{center}
```

```
\end{figure}
```

Once the LaTeX document is compiled, the figure in the PDF becomes active, and when clicked, it will invoke VisTrails and reproduce the result. You can also upload your results to [CrowdLabs](http://www.crowdlabs.org) and export them to Web sites or Wikis, where users can interact with them through a Web browser. See e.g., <http://www.crowdlabs.org/vistrails/medleys/details/26/>

Building Workflows

VisTrails supports workflows expressed as dataflows. It can also support functional loops and conditional statements (new in VisTrails 1.3!). In addition, VisTrails is easily extensible; users can quickly create new modules or wrap existing code or libraries for use as modules in VisTrails. Also, the PythonSource module can be used to write one-time translations or test code in a workflow. See the [Users' Guide](#) for more details on all of these features.

Combining VisTrails Provenance with other Tools



The VisTrails provenance infrastructure can also be combined with interactive tools. We are developing a series of provenance plugins for different tools, including [VisIt](#) and [ParaView](#). The [open-source ParaView plugin has been released](#).

Visualizing and Comparing Workflow Results

VisTrails provides a *spreadsheet* where users can compare the results of multiple workflows, or multiple workflow runs. Besides using a desktop, you can display the results of VisTrails workflows on a display wall or on an iPod. Users can also compare different workflows using the visual difference interface.

Querying and Refining Workflows by Example

Users can quickly construct expressive queries over a collection of workflows by example, using the same familiar interface they use to build workflows. VisTrails also provides an analogy mechanism whereby

users can perform complex modifications to workflows by analogy, without having to directly modify the workflow specifications.

System Documentation

If you want to get more information about VisTrails you can consult the Users' Manual or the FAQ (see links below). If you have questions that are not answered in these resources, you can post it to the users' mailing list: <http://www.vistrails.org/index.php/MailingLists>

To report bugs, please use our bug tracker: <https://github.com/VisTrails/VisTrails/issues>