

Graphviz – Open Source Graph Drawing Tools

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1 Short Description

Graphviz is a heterogeneous collection of graph drawing tools containing batch layout programs (**dot**, **neato**, **fdp**, **twopi**); a platform for incremental layout (**Dynagraph**); customizable graph editors (**dotty**, **Grappa**); a server for including graphs in Web pages (**WebDot**); support for graphs as COM objects (**Montage**); utility programs useful in graph visualization; and libraries for attributed graphs. The software is available under an Open Source license. The article[1] provides a detailed description of the package.

The Graphviz software began with a precursor of **dot** in 1988, followed by **neato** in the early 90's. The features expanded greatly over the years, driven by user request. Graphviz became Open Source in 2000, and was recently distributed on about 500,000 CDROMs as an add-on package for the SUSE Linux release, and is redistributed by Debian, Mandrake, SourceForge, and soon OpenBSD.

2 Areas of Application

Thanks to the variety of components available and its open, “toolkit” design, Graphviz supports a wide variety of applications. The foremost application is probably presentation layouts, such as including graphs in papers. As stream processors, the Graphviz tools can be used as co-processes with interactive components to provide dynamic layouts for debuggers, process monitors, program analysis software, etc. Graphviz tools have been adopted as a visualization service by the W3C Resource Description Framework XML project at MIT, and the Doxygen software engineering system.

3 Layout Algorithms and Layout Features

At present, Graphviz offers 3 batch layout algorithms: hierarchical, symmetric and circular, each allowing extensive parameterization. There is also an incremental hierarchical layout, with plans to provide incremental versions of all layouts. A distinguishing feature of the layouts is their support of a rich graphics model for nodes, and many output formats, such as PostScript, SVG, HPGL, JPEG, etc.

4 Architecture

The Graphviz architecture follows the Unix “toolkit” model, having multiple open layers, including C libraries, scripting language interfaces, stream processors and editors with GUIs. This provides the most flexibility and opportunities for reuse.

4.1 Programming Language and Operating System

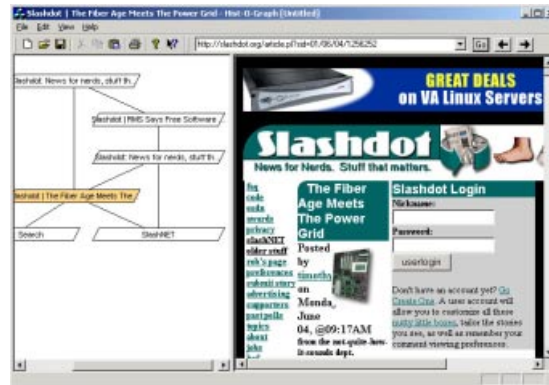
The base software uses C, C++ and Java. APIs are also available for perl and tcl. The **dotty** editor is customized using the **lefty** scripting language. Graphviz runs on most versions of Unix and Windows.

5 Interfaces

By its nature, Graphviz has many levels of interfaces, from programming language APIs to customizable editors to command-line tools to servers.

6 Screenshot

The figure below shows **Histogram**, a 100-line C++ program using **Montage** and **Dynagraph**. It provides a clickable nonlinear history display as a browser feature.



References

1. E.R. Gansner and S.C. North. An open graph visualization system and its applications to software engineering. *Software – Practice and Experience*, 30:1203–1233, 2000.