

# GLIDE

Kathy Ryall

MERL, 201 Broadway, Cambridge, MA 02139, USA, [ryall@merl.com](mailto:ryall@merl.com)

## 1 Short Description

The GLIDE (Graph Layout Interactive Digram Editor) system (first presented at GD'96 [4]) improves on general constraint-based approaches to drawing and layout by supporting only a small set of “macro” constraints, known as VOFs (visual organization features). They are specifically suited to graph drawing, contributing both aesthetic and semantic information. To date, GLIDE remains the only interactive graph drawing tool to support the use of VOFs or similar constructs. More recent work [1][3] has begun to investigate the importance of visual organization in graph drawing.

## 2 Areas of Application

GLIDE is intended for interactive drawing of small graphs, most often used in publications or presentations. By exploiting the advanced techniques that have been developed by both the graph-drawing or constraint-based-layout communities, GLIDE supports the exquisite symmetries, spacings, and alignments that graphic designers utilize in professional-grade work.

## 3 Layout Algorithms and Layout Features

GLIDE is based on constraints, but ones that are designed specifically for drawing graphs, not general graphics. These “macro” constraints, or *Visual Organization Features (VOFs)* [2], and their application in GLIDE are described more fully in [5]. In GLIDE, VOFs can be applied and removed interactively. Furthermore, the tool enforces syntactic constraints, such as preventing nodes overlapping other nodes/edges. The VOF and syntactic constraints are enforced by a generalized spring algorithm.

GLIDE converts each VOF instance into a set of constraints. The physical simulation of the resulting mass-spring model is continuously animated, indicating to the user the influence of the chosen VOFs. The user may move nodes and groups of nodes while the simulation proceeds in order to aid the system in finding better global solutions to the implicit constraint-satisfaction problem. The use of a constraint-satisfaction scheme (mass-spring simulation) that is intuitive and predictable, rather than one better at finding global solutions, is deliberate. GLIDE is intended to support a user and the computer in jointly solving the layout problem. For this purpose predictability, simplicity, and the compelling nature of the animation are more important than global optimality.

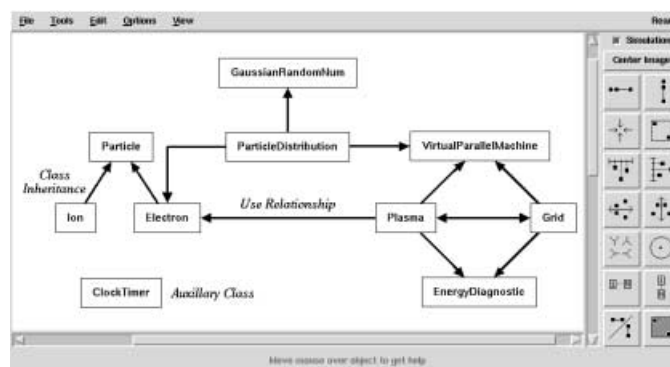
## 4 Architecture

Glide is written in C and Tcl/Tk, and currently runs under most flavors of Unix.

## 5 Interfaces

Figure 1 depicts GLIDE's interface, displaying a graph layed out using a variety of VOFs — *Symmetry*, *Alignment*, *HubShape*. GLIDE supports other standard functionality (e.g. ability to change fonts, colors, shapes, etc). The VOFs we support provide a natural and powerful vocabulary for users to express easily the desired characteristics of a graph layout; our intuitive constraint-satisfaction method allows for a collaborative interaction between user and computer. An informal comparison with commercial drawing packages shows GLIDE to be markedly superior for drawing small, aesthetic graphs.

## 6 Screenshot



**Fig. 1.** The GLIDE interface

## References

1. Stina Bridgeman and Roberto Tamassia. A user study in similarity measures for graph drawing. In *Proc. of Graph Drawing 2000*, pages 19–30, 2001.
2. Corey Kosak, Joe Marks, and Stuart Shieber. Automating the layout of network diagrams with specified visual organization. *IEEE Transactions on Systems, Man, and Cybernetics*, 24(3):440–454, March 1994.
3. Helen Purchase, Jo-Anne Alder, and David Carrington. User preference of graph layout aesthetics: A uml study. In *Proc. of Graph Drawing 2000*, pages 5–18, 2001.
4. Kathy Ryall, Joe Marks, and Stuart Shieber. An interactive system for drawing graphs. In *Proc. of Graph Drawing 96*, pages 387–393, September 1996.
5. Kathy Ryall, Joe Marks, and Stuart Shieber. An interactive constraint-based system for drawing graphs. In *Proc. of UIST 97*, pages 97–104, Banff, Alberta, October 1997.