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World Wide Web FREE

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"Number of Variables," "Discipline and Application," "Hardware and Software," and "Contributors." I found Appendix B, "Taxonomy of Visualization Goals," to be the most useful.

The only addition I would suggest is the inclusion of a bibliography. Several times I found myself paging through the "Effective Visualization" section, searching for a particular reference I recalled seeing.

In conclusion, I recommend this book for anyone engaged in trying to make sense of data. The many examples alone make this a book worth having. ♦

World Wide Web

T. Berners-Lee *et al.*

New edition published daily. Available free of charge to Internet users.

Reviewed by Dimitri Dimitroyannis

Hypermedia is not simply 1990s hype; all researchers use hypertext, perhaps without knowing they are doing so. When our writings refer to the efforts of others by explicitly citing their work, we automatically turn our manuscripts into hypertext—text that is not linearly constrained and that contains information links to other documents. To profit from the hypertextual nature of scientific literature, however, one needs readily accessible copies of the links contained in the hyper-document. These readily accessible copies are analogous to the existence of a good local research library. A well-supported library is never enough, though; one has physically to do the linking. This involves legwork to the stacks, the copier, etc., possibly only to discover upon returning to one's study that a reference in the original paper contains an important link to some earlier work and that more visits to the library are needed, guaranteeing frustration and productivity loss.

Similarly, if a library card catalog can be searched from a remote computer screen, why not use existing technology to implement a realistic hypermedia scheme? Modern visions of hypermedia exist in the works of Vannevar Bush (notably his "Memex," a mechanical memory extension device) and, later, in Theodore Nelson's "Literary Machines."

The World Wide Web was started in 1989 by Tim Berners-Lee at the research facility CERN in Geneva, Switzerland, as an initiative to encourage physicists to share information over wide-area networks. The Web has since become the de facto standard for hypermedia implementation over the Internet. The experimental particle physics community was the ideal place for such an initiative: there are few laboratory sites, the large collaborations formed are geographically dispersed, and the infrastructure in computers and computer networks already exists.

The Web is built around the client-server paradigm. The user of the Web sits in front of a networked "client" (usually a graphics terminal) running a Web "browser." The browser instructs a "server" (usually another remotely located computer) to provide a specific hyper-document. The document is de-

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livered and displayed on the client's screen. References in this hyper-document, called "links," are represented as highlighted portions of text. The user clicks the mouse on a specific link, and the referenced document, which may or may not reside on the same server as the original document, is itself retrieved and displayed on the client.

Every hyper-document on the Web is named using a standard convention called the Universal Resource Locator (URL), which allows the browser to search for the server and for the exact location on the server where the requested document is stored. The power of the Web comes from its ability to address data with URLs on FTP archives, gophers, and usenet news lists. A hypertext document in its simplest form is a simple ASCII file with a "control notation" to specify the links to other documents. This simplicity makes the creation of hypertext easy for anyone with a word processor.

Everything about the Web can be found by browsing on the Web itself; it is its own "World Wide Web Manual." The preferred method for accessing the Web is to run a browser on a local networked computer. Excellent graphics browsers exist for X-Windows, Macintosh, and PC/Windows platforms. For instance, the NCSA's (National Center for Supercomputing Applications) "Mosaic" browsers for all three of these platforms can be obtained by anonymous FTP at *ftp.ncsa.uiuc.edu.* To learn more about the Web, point your browser to *http://info.cern.ch/hypertext/WWW/TheProject.html.*

The World Wide Web is an unexpectedly successful spin-off of high-energy physics. True to the traditions of its field, CERN has made a huge amount of Web-related software available to academic and educational users free of charge. The same holds for the work of the NCSA and its impressive browsers. Such policies guarantee the growth and accessibility of this new form of communication.

Testimony to the utility of the Web is its explosive growth outside and far away from the narrow corridors of accelerator laboratories. As this review goes to press, an estimated 5% of the NSF backbone traffic is Web-related, and the number of Web server sites doubles every 75 days. ♦