

Preface

The explosive growth of uses for computer networks and users of such networks has been characterized by and depends on technical advances in many directions and along many dimensions. The entire computer industry has been affected by the dramatic and rapid shift of information, communications, applications, and businesses to direct residence on and indirect access through networks and especially the Internet. Hardware, software, applications, processes, timing, and many other computer-based aspects of personal and business life have been altered or re-engineered. Old methods and goals have been modified or discarded; new ones have been and will continue to be created.

This issue spans a considerable range of products, methods, and applied research for new and improved Internet capabilities. There are nine papers on such diverse topics as messaging, education, security, payment systems, and data mining. We are indebted to W. A. Kellogg of the T. J. Watson Research Center, IBM Research Division, in Hawthorne, New York, for her notable efforts and energy in the formation, coordination, and development of this issue.

Von Känel et al. discuss the current difficulties that arise in using gateways to convert proprietary mail system formats to the standards of the Internet. They describe the present situation for e-mail standards on the Internet and what is now available in proprietary e-mail systems. They then proceed to describe technologies that they developed to help build new clients and servers for e-mail systems based on Internet standards and to easily adapt existing proprietary systems to the Internet.

The evolution of a product from its beginnings as a research project is presented by Kellogg et al. They describe how the design and development that produced NetVista* was led by experts in human-computer interaction. Object-oriented technology under-

lies NetVista, which supports Internet access for students and teachers in schools below college level.

Security for Internet-based systems is an important consideration in transmitting any data. In the paper by Cheng et al., an architecture for securing data at the Internet Protocol layer is described. Three components of this architecture together permit a secure channel to be established between any two systems on the Internet. The architecture is part of IBM's fire-wall product.

Many applications for use on the Internet, such as filing taxes and making reservations, require authentication and nonrepudiation from users. Herzberg and Naor describe an electronic signature mechanism called Surf'N'Sign. After discussing some other approaches to the problem of authentication on the Internet, the authors present details of the prototype of this mechanism.

With the advent of electronic commerce on the Internet, methods for receiving payments have become necessary. The paper by Abad Peiro et al. presents a framework that allows applications to use different payment systems transparently, resulting in a generic payment service. Unified application programming interfaces form a primary component of this service.

As use of the World Wide Web has grown, many organizations with Web sites have become interested in knowing what type of Web surfer accesses their sites. Wu, Yu, and Ballman describe a tool, called SpeedTracer, that employs data mining to determine the surfing behavior of Web users. An analysis of the data obtained can identify user browsing patterns derived from the most frequently used paths and the groups of pages most frequently visited.

Break-ins and disablements of computer systems connected to the Internet are major concerns. Bou-

langer describes some of the tools and techniques devised by both computer security professionals and computer hackers to attack systems. An example of an attack on the computer network of a corporation is given to show the importance of being aware of various possible methods of attack and the necessity of implementing safeguards.

Legacy data residing on mainframe computers or other mature platforms is a large source of information that is not now readily available to browsers on the World Wide Web. The paper by Peng et al. and the one by Tan et al. discuss how these data can be accessed by Web clients. In the former, the authors describe major approaches to integrating Web technology with database management systems. They then discuss two IBM gateways for accessing DB2* data: DB2 World Wide Web Connection, and its successor Net.Data* 2. These solutions for Web-based access to existing technology belong to a type of software known as middleware.

Tan et al. describe an approach that uses a Java** applet as an emulator to allow Web users access to systems running 3270 (host) technology. Called IBM Host On-Demand, it is an Internet-to-SNA interconnection that provides access to 3270 applications through the World Wide Web. It offers host security, customized windows, and multiplatform capability, among others, and is part of IBM's eNetwork* software.

As the *Journal* begins its 37th year, we would like to acknowledge the support of readers, authors, and referees that makes such a long history possible. We thank you and encourage you to continue your interest and participation in this publication. In 1997, the 126 authors represented IBM (57 percent) and other sources (43 percent), and the United States (53 percent) and other countries (47 percent). It also seems appropriate at such a time to state a few facts that sometimes escape us as we focus on a single paper, theme, or special issue. First, this publication is a quarterly refereed technical journal, which means that the integrity of each paper is ensured by a process that depends upon peer reviews of content, currency, and value by recognized experts within and outside IBM. Second, it is intended for the software and systems professional and applied research community worldwide. The papers are written for a technically aware readership, and we welcome submissions by knowledgeable authors around the globe, within and outside IBM. Third, the *Journal* has over 50 000 subscribers worldwide. Of those, approxi-

mately two-thirds are technical professionals and researchers outside IBM and one-third are IBM employees, and two-thirds are in the United States and one-third are outside the United States.

The next issue of the *Journal* will include a special section on IBM's object-oriented San Francisco Frameworks and their use for software development.

Gene F. Hoffnagle
Editor

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