

From the Editor-in-Chief . . .

In the Thick of Things

Munindar P. Singh • singh@ncsu.edu

Like many techies, I've been wondering what changes we'll see in the Internet in the coming years. In doing so, I look at the Internet in the broad sense, at the level of applications and uses, but without abandoning a technical perspective. What new kinds of applications will we see, and what will programmers have to do differently to take advantage of new technologies and implement new applications?



Made-to-Fit Interfaces

From the perspective of applications and systems programming, the most appropriate conceptualization of the Internet is based on the interactions—between people and between people and computers—that it supports. And despite all its clever features, today's Internet is still quite unimpressive in the kinds of interactions it enables. I believe the main requirement for the Internet's further success is the development of better user interfaces. Interfaces will drive—or limit—the Internet's expansion into our daily lives.

Today's Internet is still quite unimpressive in the kinds of interactions it enables.

The true value of a user interface lies not only in the quality of displays and the richness of the media it supports, but also in how naturally it fits into a user's life. I believe the technical challenges to developing better interfaces lie not so much in the actual interface technologies as in building the right software abstractions. This is not to say that interface technologies such as virtual reality and speech aren't important, but that progress in these fields has been and continues to be so good that they cannot be thought of as limiting factors. However, we need to think more about the software abstractions that cohere best with the ordinary environments in which the Internet will increasingly be applied.

Going Mobile

Currently, our interactions with the Internet occur mostly in controlled settings, using a desktop or a laptop computer. But users are increasingly moving to smaller, more portable devices such as cellular phones and PDAs, which many people find more convenient and less threatening. Portable devices offer new challenges and opportunities. On the one hand, portability severely constrains the interaction modalities, because of

smaller displays, more difficult data entry, lower bandwidth, and so on. On the other hand, a portable device is physically present where the user needs it. This means the device can conceptually be part of whatever the user is doing, anywhere and anytime. Today's approaches mainly address the obvious challenges of portability, but they fail to exploit the opportunity that portability offers.

Linking the Internet to Our Lives

Portability offers an opportunity for computing to participate intelligently in users' activities. But how, exactly? To incorporate the Internet into your activities, you not only have to be connected to it (so that it "knows"—in a broad sense—who and where you are), you must also make it aware of what you are doing so that it can determine how best to help you. In other words, to become even more useful, the Internet must move from knowing just your name and e-mail address in the wired version to also knowing your location in the wireless version and then to knowing your history, current situation, and needs. These would include what you have been doing, where you are, and what you wish to do.

The only way to understand and engineer this helpful, personalized Internet is to advance the knowledge representations (roughly, data structures) on both the connecting devices and the servers that maintain appropriate information about users. Such information will be inherently sensitive, and to protect privacy its distribution will have to be under the user's control. You want the Internet to know what you are doing, but you don't want others to know any more about you than you wish to reveal.

These requirements constitute a classic case for the application of agents to provide the Internet with intelligence and a repository of knowledge, assist users in their daily work, and represent them in their interactions with other users and services. The Internet may know a lot about you, but only through your agents; others on the Internet will know very little. Because they are active and persistent, the agents can gather information about you and apply it to seek out opportunities and synergies on your behalf.

When agents residing on devices and servers can act adaptively on the basis of familiarity with users' everyday lives, the Internet will move to a new level of convenience. Rather than an isolated information source accessed from an office, it will be a meaningful presence in daily activities, right in the thick of things. ■

How to Write for *IC* . . .

IEEE Internet Computing is a bimonthly magazine focused on Internet-based applications and supporting technologies. We seek articles on the use and development of Internet applications, services, and technologies that let practitioners leverage them in engineering and applying the Internet toolset. We aim to support individual engineers, as well as groups, in collaborative and coordinated work.

All articles are subject to peer review and should be submitted in HTML or a common format (such as Postscript) easily read by reviewers. Submissions should be relevant to the typical professional subscriber of *IC* and should illustrate the applicability or effect of a specific Internet-based technology. Fielded, tested applications with hard results are preferred. Prototypes must at least include test results.

IC does not include network software or hardware per se, though it will include hardware that directly affects the execution of a specific Web technology (for example, Java chips). Submissions should be no longer than 6,000 words.

For detailed instructions, see our
Author Guidelines at

<http://computer.org/internet/edguide.htm>.



The logo for IEEE Internet Computing features the IEEE logo in a yellow box on the left, followed by the words "Internet Computing" in a large, bold, black serif font.

IEEE INTERNET COMPUTING

IEEE Computer Society Publications Office
10662 Los Vaqueros Circle, PO Box 3014
Los Alamitos, CA 90720-1314

EDITOR-IN-CHIEF

Munindar P. Singh • singh@ncsu.edu

ASSOCIATE EDITOR-IN-CHIEF

Robert Filman • rfilman@arc.nasa.gov

EDITORIAL BOARD

Miroslav Benda • miro@oasa.com

Scott Bradner • sob@harvard.edu

K. Mani Chandy • mani@cs.caltech.edu

Fred Douglass • douglass@research.att.com
(Liaison to CS Technical Committee on the Internet)

Stuart I. Feldman • sif@us.ibm.com

Li Gong • gong@games.eng.sun.com

Seif Haridi • seif@us.ibm.com

Michael N. Huhns • huhns@sc.edu

Ray W. Johnson • rayj@best.com

Gail E. Kaiser • kaiser@cs.columbia.edu

Leonard Kleinrock • lk@cs.ucla.edu

Doug Lea • dl@altair.cs.oswego.edu

Frank Maurer • maurer@cpsc.ucalgary.ca

Charles E. Perkins • charliep@iprg.nokia.com

Charles J. Petrie • petrie@cdr.stanford.edu
(EIC emeritus)

Agostino Poggi • poggi@ce.eng.unipr.it

William Regli • wregli@mcs.drexel.edu

Helmuth Ritzer • ritzer@str.daimler-benz.com

Anthony Michael Rutkowski • amr@chaos.com

Ravi Sandhu • sandhu@isse.gmu.edu

Henning Schulzrinne • schulzrinne@cs.columbia.edu
(IEEE Communications Society Liaison)

Brian Thomas • brian@spie.org

STAFF

Managing Editor: **Linda World**
lworld@computer.org

Staff Editor: **Joan Taylor**
jtaylor@computer.org

Editorial Asst./IC Online Design: **Steve Woods**
swoods@computer.org

Magazine Assistant: **Hazel Kosky**
hkosky@computer.org

Art Director: **Joseph Daigle**

Cover Design: **Dirk Hagner**

Graphic Artist: **Ken Duckworth**

Contributing Editors: **David Clark,**
Keri Schreiner, Martin Zacks

Publisher: **Angela Burgess**

Membership/Circulation Marketing Manager: **Georgann Carter**

Advertising Manager: **Patricia Garvey**

Advertising Supervisor: **Marian Anderson**

CS MAGAZINE OPERATIONS COMMITTEE

Gul Agha (chair), William Everett (vice chair),
James H. Aylor, Jean Bacon, Wushow Chou,
George Cybenko, William I. Grosky, Steve McConnell,
Daniel E. O'Leary, Ken Sakamura, Munindar P. Singh,
James J. Thomas, Yervant Zorian

CS PUBLICATIONS BOARD

Ben Wah (chair), Jon Butler, Carl Chang, Alan Clements,
Dante Del Corso, Richard Eckhouse, William Everett,
Francis Lau, Dave Pessel, Sorel Reisman

