



From the Editor in Chief...

Who You Gonna Call?

Munindar P. Singh • North Carolina State University • singh@ncsu.edu

Because the Web is an open system composed of autonomous, heterogeneous parties, every user eventually faces the non-trivial task of deciding who to interact with — whose site to browse and with whom to play or do business. In this, my final column as editor in chief of *IEEE Internet Computing*, I'll explore the question in the title — as made famous by the 1980s movie *Ghostbusters*.

Looking up Repositories

Given the current state of Web technology, the “official” answer for choosing and locating a party to interact with has so far been to search one or more repositories or directories. These repositories could be handmade or automatically generated by a search engine (and looked up implicitly in response to a user's search).

This approach works moderately well when the interactions are to be carried out by humans. Although Web searches are notorious for low precision (too many irrelevant answers or false positives) and low recall (too few relevant responses or false negatives that miss good results), people can generally judge a page's relevance and choose whether to interact with it.

Yet, the growing interest in Web services takes the idea a little further. Providers now formally describe services in terms of their method signatures, which can be located via a repository according to some specified criteria. This means a program can, in principle, automatically locate and invoke services. Whereas human users can recognize which Web pages they wish to browse, programs that automatically invoke services based solely on method signatures can have unexpected results. Two services might have the same signature, for example, but behave quite differently.

Informal Answers

Of course, the official solution is not the only way to locate Web pages or services. Informal infor-

mation exchanges — for example, when a friend queries you about (or sends you potentially interesting) links — often provide the best responses to specific needs. When a disk crashed recently on my home computer, a colleague sent me pointers to several disk recovery services that catered to home offices; my computer vendor's technical support person also offered some suggestions. Finding a good service on my own would have been much more difficult because although the world's search engines would certainly offer numerous suggestions, I wouldn't know which to trust. In other words, I would still be left asking, “Who am I gonna call?”

Approximations of Trust

Techniques such as digital certificates partially support the development of webs of trust, but current approaches have three basic limitations. First, there is no way to decide which of the several advertised certificate authorities (CAs) is truly authoritative for your purposes.

Second, such approaches take a remarkably coarse-grained view of trust in which the user is expected to trust someone merely because they have a certificate issued by some authority. Assuming for a moment that you trusted the CA fully, how could you trust the party it certified? At most, the CA is stating that the party with the certificate is who it claims to be. The CA does not, and cannot, guarantee that the party will act efficiently, effectively, or in good faith because the various parties are autonomous and their domains are varied. After all, the CA isn't a user; it is merely a repository.

Third, like Web search engines and service repositories, CAs offer the same information for all comers. Doing so might enable economies of scale, but it ultimately hurts quality. Whether a given party is trustworthy is an ill-formed question because trust is more than just a property of the party being considered; it also depends on the

details of the action in question and the requestor's goals. For this reason, a repository can never offer more than a first approximation to trust.

A Social Approach

To build true webs of trust that address the concerns I mentioned about current approaches, I propose that individual parties help each other find trustworthy services. In other words, the question in the title becomes "Who you gonna call to ask who you gonna call?" Each party would use its personalized trust relationships to refer its associates to services or to other parties that might know about the relevant services.

Each party would ask parties that it trusts already, and the ultimate recommendation would generally come from someone who has used the service (except with brand-new services). Moreover, services could be recommended in a manner that is sensitive to the party's needs and the context of the ongoing interactions. For this approach to scale, we need tools that enable referrals to be generated in a dynamic version of Web links. The approach would coexist with traditional repositories to ensure the necessary coverage when our associates are unable to help.

The value of the social approach lies in the fact that it offers a simple means for people to share their personal repositories of services through specialized, context-sensitive searches. Each party could essentially generate a custom repository of services or other prospective repositories on demand for its associates. In this way, you would know who to call because you would know who to ask about who to call. □

Changing of the Guard

This issue marks the end of Munindar Singh's second term as editor in chief of *IEEE Internet Computing*, ending his stewardship under IEEE guidelines.

After serving as associate editor in chief under founding EIC Charles Petrie, Munindar took over in 1999. Under his watch, the magazine has continued to evolve into one of the most popular IEEE publications, and we greatly appreciate his efforts. Happily, we are not really losing him, as Munindar will remain an active member of *IC*'s editorial board.



Bob Filman

For the 2003-2004 publication years, we are pleased to welcome Robert Filman as the magazine's new EIC and Li Gong as AEIC. Bob has been on *IC*'s board since the magazine's inception, serving as a columnist, guest editor, and AEIC.

In the two years since Li joined the board, he has guest edited theme issues on security and peer-to-peer networking.



Li Gong

We look forward to working with them as *IC* tracks the development of the next generation of Internet technologies.

— *IC* staff

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

Salah Aidarous • saidarous@aol.com
(IEEE Communications Society Liaison)

Jean Bacon • jean.bacon@cl.cam.ac.uk

Miroslav Benda • miro@amazon.com

Elisa Bertino • bertino@dsi.unimi.it

Scott Bradner • sob@harvard.edu

Fred Douglass • f.douglass@computer.org

Stuart I. Feldman • sif@us.ibm.com

Ian Foster • foster@cs.uchicago.edu

Li Gong • li.gong@sun.com

Michael N. Huhns • huhns@sc.edu

Leonard Kleinrock • lk@cs.ucla.edu

Doug Lea • dl@altair.cs.oswego.edu

Frank Maurer • maurer@cpsc.ucalgary.ca

Chris Metz • chmetz@cisco.com

John Mylopoulos • jm@cs.toronto.edu

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

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

Agostino Poggi • poggi@ce.unipr.it

Krithi Ramamritham • krithi@cse.iitb.ac.in

Ravi Sandhu • sandhu@gmu.edu

STAFF

Group Managing Editor: Gene Smarte
gsmarte@computer.org

Lead Editor: Steve Woods
swoods@computer.org

Associate Editor: Jenny Ferrero
jferrero@computer.org

Staff Editor: Scott Andresen
sandresen@computer.org

Production Assistant: Monette Velasco
mvelasco@computer.org

Magazine Assistant: Hazel Kosky
internet@computer.org

Graphic Artists: Larry Bauer, Alex Torres

Contributing Editors: David Clark, Greg Goth,
Keri Schreiner, Linda World, Martin Zacks

Publisher: Angela Burgess

Membership/Circulation Marketing Manager:
Georgann Carter

Business Development Manager: Sandy Brown

Advertising Supervisor: Marian Anderson

CS Magazine Operations Committee

George Cybenko (chair), James H. Aylor,
Thomas J. Bergin, Frank E. Ferrante, Forouzan Golshani,
Rajesh Gupta, Steven C. McConnell, Ken Sakamura,
Mahadev Satyanarayanan, Nigel Shadbolt,
Munindar P. Singh, Francis Sullivan, James J. Thomas

CS Publications Board

Rangachar Kasturi (chair), Mark Christensen,
George Cybenko, Thomas Keefe,
Richard A. Kemmerer, Gabriella Sanniti di Baja,
Steven L. Tanimoto, Anand Tripathi

