

IEEE Internet Computing

www.computer.org/internet-computing

Having One's Head in the Cloud

Barry Leiba

Vol. 13, No. 5
September/October, 2009

This material is presented to ensure timely dissemination of scholarly and technical work. Copyright and all rights therein are retained by authors or by other copyright holders. All persons copying this information are expected to adhere to the terms and constraints invoked by each author's copyright. In most cases, these works may not be reposted without the explicit permission of the copyright holder.

IEEE  computer society

© 2009 IEEE. Personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution to servers or lists, or to reuse any copyrighted component of this work in other works must be obtained from the IEEE.

For more information, please see www.ieee.org/web/publications/rights/index.html.



Having One's Head in the Cloud

Barry Leiba

Earlier this year, after attending a trade show on cloud computing, I came away with two things: the idea that it was more “real” than I’d appreciated and a sense of *déjà vu*. I planned to discuss cloud computing over the next few months culminating in the special theme issue you have before you. This time, just as I went to write my column, I came across a blog entry by editorial board member Barry Leiba, talking about how cloud computing had come full circle toward logically centralized administrative domains and shared computational resources, and I realized that he described that sense of *déjà vu* quite well. I asked him to share it with you.

— Fred Douglis, Editor in Chief

Computer trends are interesting to follow — well, for some value of “interesting,” but bear with me here. They keep changing, and, as with clothing, the chic trends this year soon become *passé*, replaced by newer ones. It often seems that it’s really the words that change, while the actual trends continue pretty much intact. Some years ago, we liked “e-Utilities,” then “autonomic computing,” later “on-demand computing,” and now “software-as-a-service” (SaaS or SAS, depending upon who’s abbreviating it). To be sure, at some level, these aren’t all the same thing. Yet, when it comes to describing a way of providing computer services as needed, in a sort of plug-and-play manner, it’s easy to make your project or product fit them all.

In that sense, they become buzz words, and as the operative buzz words change, we spin our project proposals or our product advertising to take maximum advantage of the “new trend.”

“Distributed computing,” “cluster computing,” “grid computing,” and “cloud computing” are all terms that have developed over the past few years. Each is distinct from the others in some ways, but there’s a great deal of overlap. A turn-of-the-century distributed computing application that has the right profile could easily have morphed through the series, proudly calling itself

a cloud computing application today. There’s a lot of fluff here — yes, “cloud,” “fluff” — sorry.

Eric Rescorla gives an opinion on cloud computing at Educated Guesswork (www.educatedguesswork.org/2009/07/why_cloud_computing.html), and I agree with him that it’s a mixed bag. All the mechanisms in the list I mentioned earlier have some of the characteristics Eric talks about, such as the ability to draw on more resources only when they’re needed, avoiding over-provisioning the system all the time. You could actually say that it works autonomically, or on-demand — but nevermind.

What I think is interesting about the emphasis on cloud computing, and putting your data and services “in the cloud,” is that we’ve come close to completing a circle. In the 1970s, we used “dumb terminals” that talked to “mainframe computers,” behemoths that sat in large data centers. The terminal was an I/O device but was not itself a computer. So, all the programs and the data lived and ran on the mainframe. We had central management of everything, and the only way to distribute the cost was to charge for mainframe resource use — processor cycles, data storage, and so on.

In the 1980s, we developed personal computers and started using them seriously. The computer on your desk would run a “terminal emulator” that accessed the mainframe, but it also ran its own programs, starting to pull away from central management. We did spreadsheets and word processing and that sort of thing without ever touching someone else’s computer. We still stored data in the data center — it had far more capacity, of course — but we no longer stored everything there. And some of the cost was distributed to the users, who paid for their own computers and software.

In the 1990s, as the World Wide Web developed, we did more and more on our own computers and relied far less on the data center, to the point that many people in offices — and pretty

New Editorial Board Member

Erich M. Nahum is a research staff member at the IBM T.J. Watson Research Center. His research interests span all aspects of experimental networked systems performance, including SIP, HTTP, TLS/SSL, instant messaging, TCP/IP, workload characterization, workload generation, dynamic content, clusters, multiprocessors, operating systems, and security. Nahum has a PhD from the Department of Computer Science at the University of Massachusetts at Amherst. He currently chairs the industry standard SPEC SIP Subcommittee. Contact him at nahum@watson.ibm.com.

much everyone at home – made no use of it at all.

Of course, no one ran everything on her own computer, either. The whole point of the Web is to make it easy to find and retrieve things from other computers on the Internet, and over time, more and more services have become available to us.

But we ran our own browsers and office software and email programs and lots of other programs. And, as a result, we had to manage all that software ourselves. Be sure to update all your software regularly, we've been reminded, to make sure long-fixed program bugs don't bite you. Upgrade periodically to get new features, keep your antivirus definitions up to date, and remember to back up your hard drive regu-

larly, lest you have a disk crash and lose all.

Now, in the 2000s, we're moving back. Keep your backups at someone's Internet data center – they'll give you lots of free space, and you can pay for more storage and features. Next, keep your data somewhere else in the first place, using webmail or "virtual hard drives" on the Internet. Then, run

your software somewhere else, with things like Google Docs – they'll take care of storing your data, making sure it's backed up, scanning it for viruses, making sure the software that uses it is properly updated, and so on.

What, now, is the real difference between computing in the cloud – or on the grid or whatever, in what we've come to call "federated" sys-

Editor in Chief

Fred Douglass • f.douglass@computer.org

Associate Editors in Chief

Siobhán Clarke • siobhan.clarke@cs.tcd.ie
Michael Rabinovich • misha@eecs.cwru.edu

Editorial Board

Virgilio Almeida • virgilio@dcc.ufmg.br
Helen Ashman • helen.ashman@unisa.edu.au
Elisa Bertino • bertino@cerias.purdue.edu
Azer Bestavros • best@cs.bu.edu
M. Brian Blake • mb7@cse.nd.edu
Vinton G. Cerf • vint@google.com
Stephen Farrell • stephen.farrell@cs.tcd.ie
Robert E. Filman* • filman@computer.org
Carole Goble • cag@cs.man.ac.uk
Michael N. Huhns • huhns@sc.edu
Doug Lea • dl@cs.oswego.edu
Barry Leiba • barryleiba@computer.org
Samuel Madden • madden@csail.mit.edu
Mark Manasse • manasse@microsoft.com
Cecilia Mascolo • c.mascolo@cs.ucl.ac.uk
Pankaj Mehra • pankaj.mehra@hp.com
Chris Metz • chmetz@cisco.com
Dejan Milojčić • dejan@hpl.hp.com
Erich M. Nahum • nahum@watson.ibm.com
Jason Nieh • nieh@cs.columbia.edu
Charles J. Petrie* • petrie@stanford.edu
Krithi Ramamritham • krithi@cse.iitb.ac.in
Amit Sheth • amit.sheth@wright.edu
Munindar P. Singh* • singh@ncsu.edu
Oliver Spatscheck • oliver@spatscheck.com
Torsten Suel • suel@poly.edu
Craig W. Thompson • cwt@uark.edu
Shengru Tu • shengru@cs.uno.edu
Maarten van Steen • steen@cs.vu.nl
Steve Vinoski • vinoski@ieee.org
* EIC emeritus



Technical cosponsor:



IEEE Communications Society Liaison

G.S. Kuo • gskuo@mail.com

CS Magazine Operations Committee

David A. Grier (chair), David Albonese, Isabel Beichl, Arnold (Jay) Bragg, Carl Chang, Kwang-Ting (Tim) Cheng, Fred Douglass, Hakan Erdogmus, Carl E. Landwehr, Dejan Milojčić, Sethuraman (Panch) Panchanathan, Crystal R. Shif, Maureen Stone, Fei-Yue Wang, Roy Want, Jeffrey R. Yost

CS Publications Board

Sorel Reisman (chair), Alain April, Angela R. Burgess, Frank E. Ferrante, David A. Grier, Audrey Kremer, Phillip A. Laplante, Paolo Montuschi,

Jon Rokne, R. Sampath, Steven Seidman, Linda I. Shafer, Roy Sterritt, Steven L. Tanimoto

Staff

Lead Editor: Jennifer Gardelle, jgardelle@computer.org
Content Editor: Rebecca Deuel-Gallegos
Magazine Editorial Manager: Jenny Stout
Staff Editors: Brian Brannon and Dennis Taylor
Publications Coordinator: internet@computer.org
Production Editor/Webmaster: Monette Velasco
Contributors: Cheryl Baltes, Greg Goth, Keri Schreiner, Joan Taylor, and Alex Torres

Director, Products Et Services: Evan Butterfield
Senior Editorial Services Manager: Crystal R. Shif
Senior Business Development Manager: Sandy Brown
Digital Library Marketing Manager: Georgann Carter
Senior Advertising Supervisor: Marian Anderson, manderson@computer.org

IEEE Internet Computing
IEEE Computer Society Publications Office
10662 Los Vaqueros Circle
Los Alamitos, CA 90720 USA

Editorial: Unless otherwise stated, bylined articles, as well as product and service descriptions, reflect the author's or firm's opinion. Inclusion in *IEEE Internet Computing* does not necessarily constitute endorsement by the IEEE or the IEEE Computer Society. All submissions are subject to editing for style, clarity, and length.

Submissions: For detailed instructions, see the author guidelines (www.computer.org/internet/author.htm) or log onto *IEEE Internet Computing's* author center at Manuscript Central (<https://mc.manuscriptcentral.com/cs-ieee>). Articles are peer reviewed for technical merit.

Letters to the Editors: Email content editor Rebecca Deuel-Gallegos, rdeuel-gallegos@computer.org. **On the Web:** Access www.computer.org/internet/. **Subscribe:** Visit www.computer.org/subscribe/.

Subscription Change of Address: Send requests to address.change@ieee.org. **Missing or Damaged Copies:** Contact help@computer.org. **To Order Article Reprints:** Email internet@computer.org or fax +1 714 821 4010.



Cisco Systems, Inc. is accepting resumes for the following position in:

Research Triangle Park, NC
Technical Leader
(Ref#: RTP5)

Leads engineering groups on projects to design, develop or test hardware or software products.

Please mail resumes with reference number to Cisco Systems, Inc., Attn: JSIW, 170 W. Tasman Drive, Mail Stop: SJC 5/1/4, San Jose, CA 95134. No phone calls please. Must be legally authorized to work in the U.S. without sponsorship. EOE.

www.cisco.com



Cisco Systems, Inc. is accepting resumes for the following position in:

Richardson, TX
Program Manager
(Ref#: RIC9)

Manage a global portfolio of professional services for the company's Unified Communications technologies including: company Unified Communications, Unified Contact Center & Telepresence. Define, price, and market services across the network lifecycle.

Please mail resumes with reference number to Cisco Systems, Inc., Attn: JSIW, 170 W. Tasman Drive, Mail Stop: SJC 5/1/4, San Jose, CA 95134. No phone calls please. Must be legally authorized to work in the U.S. without sponsorship. EOE.

www.cisco.com

tems – and computing in the data centers of the 1970s? Google is talking, with its announced operating system that ties heavily into the cloud, of moving your PC even further back to a not-so-dumb terminal that, through a Web browser, gets all of its data and services from what amounts to a data center.

More than 30 years ago, the data center was a large room with many large, noisy boxes; today, it lives in smaller, probably quieter chunks all over the world. And the circle is very close to being closed. ☐

Barry Leiba is an independent Internet standards consultant. His research interests include email and related technology; anti-spam work, messaging, and collaboration on mobile platforms; security and privacy of Internet applications; and Internet standards development and deployment. Leiba chairs the DKIM working group and the 2010 Conference on Email and AntiSpam and is the editor for the Standards column in *IEEE Internet Computing*. You can read his blog at <http://staringatemptypages.blogspot.com> and contact him at barry.leiba@computer.org.

ADVERTISER INFORMATION • SEPTEMBER/OCTOBER 2009

Advertiser Page
Cisco 6, 9, 19, 21, 80, 82
84, 85, 87, 89, 90

Advertising Personnel
Marion Delaney
IEEE Media
Advertising Dir.
Phone: +1 415 863 4717
Email: md.ieeemedia@ieee.org

Marian Anderson
Sr. Advertising
Coordinator
Phone: +1 714 821 8380
Fax: +1 714 821 4010
Email: manderson@computer.org

Sandy Brown
Sr. Business
Development Mgr.
Phone: +1 714 821 8380
Fax: +1 714 821 4010
Email: sb.ieeemedia@ieee.org

Advertising Sales Representatives

Recruitment:

Mid Atlantic
Lisa Rinaldo
Phone: +1 732 772 0160
Fax: +1 732 772 0164
Email: lr.ieeemedia@ieee.org

New England
John Restchack
Phone: +1 212 419 7578
Fax: +1 212 419 7589
Email: j.restchack@ieee.org

Southeast
Thomas M. Flynn
Phone: +1 770 645 2944
Fax: +1 770 993 4423
Email: flynntom@mindspring.com

Midwest/Southwest
Darcy Giovingo
Phone: +1 847 498 4520
Fax: +1 847 498 5911
Email: dg.ieeemedia@ieee.org

Northwest/Southern CA
Tim Matteson
Phone: +1 310 836 4064
Fax: +1 310 836 4067
Email: tm.ieeemedia@ieee.org

Japan
Tim Matteson
Phone: +1 310 836 4064
Fax: +1 310 836 4067
Email: tm.ieeemedia@ieee.org

Europe
Hilary Turnbull
Phone: +44 1875 825700
Fax: +44 1875 825701
Email: impress@impressmedia.com

Product:

US East
Dawn Becker
Phone: +1 732 772 0160
Fax: +1 732 772 0164
Email: db.ieeemedia@ieee.org

US Central
Darcy Giovingo
Phone: +1 847 498 4520
Fax: +1 847 498 5911
Email: dg.ieeemedia@ieee.org

US West
Lynne Stickrod
Phone: +1 415 931 9782
Fax: +1 415 931 9782
Email: ls.ieeemedia@ieee.org

Europe
Sven Anacker
Phone: +49 202 27169 11
Fax: +49 202 27169 20
Email: sanacker@intermediapartners.de