



From the Editor in Chief...

Weather Forecast

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This is my inaugural issue as editor in chief of *IEEE Internet Computing*. I'm starting this job at an interesting juncture for the Internet specifically and the computing industry in general. The laws of economics have been reinstated, perhaps with a sprinkle of adjustment for their neglect. (It's a sprinkle of adjustment if you're still employed, and a typhoon of vengeance if you're not.) Such periods are often termed times of *consolidation*. In this column, I'll consider some forecasts by the industry's largest consolidator. On a different note, I'll close with some forecasts on this year in *IC*.

Watertight Construction

While we're on the subject of rain, I was in Seattle in November for OOPSLA where Bill Gates gave the keynote. In his address, Mr. Gates asserted that Microsoft views "trustworthy computing" as the key to the future of Internet commerce (driven, of course, by Web services, which he assures us must conform to nonproprietary standards). He claimed that several approaches would be necessary to achieve trustworthy systems. Among them, ensuring that programming languages protect against "areas of systematic difficulty" like stack and buffer overruns and memory management errors, and performing better software processes, such as code reviews. (As 90 percent of Microsoft's code is still in C or C++, Bill will be paddling against a strong current.)

Microsoft is now heavily investing in automated program verification technology, particularly model checking (reducing programs to finite states and examining the paths among them). This technology is of special interest to Microsoft, as those with the leakiest roofs are necessarily most interested in new waterproofing techniques. That said, I'm pleased to see the interest in automatic verification because we here at NASA Ames are among the leaders in this technology (<http://ase.arc.nasa.gov/>), and any shelter from future rainstorms is welcome. Of course, I suspect that had Microsoft's architec-

ture been based on a model-view-controller (MVC) pattern – possessing an underlying software model, for which Microsoft software provided a viewer and controller – Windows and Office would not be in nearly such great need of automatic bug detection.

Shelter from the Storm

Mrs. Dooreck, my fourth grade teacher, once demanded that I improve my incomprehensible handwriting and spelling, arguing that no one was going to do those things for me when I grew up. Unfortunately, back in the mid 1960s, I hadn't the prescience to respond that it would be done by Emacs or Office – or even a Windows Tablet PC.

Mr. Gates's keynote came the day after the release of the Windows-based tablet computers, and he devoted much of his presentation to extolling and demonstrating the first versions of Windows pen-based computers (tablets) and their use of digital ink. ("Digital ink" must by now be a trademark of Microsoft Corporation, and mentioning it here probably violates the implicit license agreement presumed when I went into the conference. Ah well, we'll let IEEE's lawyers work it out.) Tablet computers are clearly nifty-looking devices, and they can even be used in "flat form" in meetings where it is a faux pas to hide behind a normal laptop screen. (This is evidently very important to Mr. Gates. I, on the other hand, never get invited to such meetings.) That said, is the Tablet PC the ultimate rebuttal to Mrs. Dooreck?

Computers are most interesting as devices for *recording* and *sharing* ideas. For textual ideas, I can type much faster than I can write. I suspect this is true for most people these days – except perhaps the most computer-phobic, but they don't seem to be good candidates for adopting anything based on Microsoft Windows. As Mrs. Dooreck pointed out, no one wants to read my handwriting, not even me. So text in raw graphic form is fairly useless, both for me and the people I com-

municate with. Until the Tablet PC's text-recognition software gets a lot better, it's going to be more trouble than it's worth. However, for communicating ideas that are primarily graphic – architectural designs or abstract graphs, for example – being able to save the picture coherently and edit it conveniently will be a big win. It remains to be seen, of course, how much the market is willing to pay for that convenience.

Flood

It's not in the online remarks (www.microsoft.com/billgates/speeches/2002/11-08oopsa.asp), but I swear I heard hints that the next version of Windows will abandon file-based database organization. (Maybe it was in the question-and-answer period?) If I had to guess (or if I ruled the world and got to invent), a non-file-based operating system would recognize that organizing files into directory trees is an implementation artifact inappropriately exposed at the user level.

There are lots of ways to look at and organize files, and there's no reason to restrict the grouping to one single-inheritance hierarchy plus explicit aliases. I should be able to talk about all the jpegs on my computer, for example, or all the jpegs used in the *rainwater* project, or the set of all jpegs of a particular resolution located throughout the programming environment, independently of some arbitrary creation tree. This multiple perspective should be visible both at the user-interface and programmatic levels. (The Mac operating system long ago recognized that users might want to say arbitrary things about a file object other than its data [the resource fork], but this innovation hasn't caught on.)

File trees are a mistake, or at least a design decision driven by slow disks and core memory that cost US\$100,000 per Mbyte. It's time to move on. Files (as a uniform substance) are a good idea, however, and having an underlying model of files (or more generally, data streams, or even more generally, "uniform substances") has allowed Unix to create a collection of mutually reinforcing programming elements, rather than islands of behavior (or islands that can be bridged only by buying expensive application suites).

Will we see a future Windows operating system with such a radical transformation? Messy architectures, digital ink technologies, and abandoning file systems for *something different* are all ways of making software systems that are difficult to copy (and might add value to the user experience – if the customer doesn't value the ability to make choices in the future). They are ways of preserving and extending market power. They are clever business decisions that have led me to buy Apple computers and Microsoft stock. (If you haven't read the Halloween documents, www.opensource.org/halloween/, they provide a bit of entertainment and education on protecting a software monopoly.) And yes, Microsoft is very interested in Web services: Office tools output could become XML, but don't count on it unless they've figured out how to turn Web services into a monopoly.

Rainbow

I would like to close by thanking *IC*'s outgoing editor in chief, Munindar Singh, for his four years of excellent editorial service. Every day I come to a greater appreciation of the job he has done in

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nurturing the magazine. Fortunately, he will continue to help us as EIC emeritus.

Li Gong of Sun Microsystems has kindly agreed to be the new associate EIC, and I feel very fortunate to have his help. Li was the architect of much of Java's security architecture, head of Sun's JXTA peer-to-peer computing effort, author of *Inside Java 2 Platform Security* (Addison Wesley, 1999), and coauthor of *Programming Open Service Gateways with Java Embedded Server Technology* (Addison Wesley, 2001) and *JXTA in a Nutshell* (O'Reilly, 2002). He is now running Sun's research labs in Beijing. If you see Li and want to embarrass him, remind him that the *San Jose Mercury News* has declared him a techie rock star.

I'd also like to welcome Siobhán Clarke to the editorial board. Siobhán is a lecturer in the Computer Science Department at Trinity College, Dublin. Her research focuses on programming models and middleware for mobile, sentient, context-aware systems. She will be helping us locate articles on software engineering and pervasive computing, as well as serving as department editor for the Spotlight tutorial series.

I'd like to thank Li and Siobhán for taking on these responsibilities. I also thank the IEEE Computer Society for entrusting me with this job.

(And, of course, my parents for making this possible, and my children for making it necessary.)

Traditionally, each issue of *IC* has featured a theme, with about a third of the magazine devoted to refereed articles on that topic. In addition to the "Middleware for Web Services" theme you're reading now, for example, we have scheduled issues this year on mobile apps, IPv6, grid computing, "the Zen of the Web" (Web semantics), and identity management. In 2003, we are introducing *tracks* – themes that will run "horizontally" throughout the year – on two important topics: security and Web services. We're also launching a guest-written column, Peer to Peer, which will present (hopefully) provocative and entertaining perspectives on a high-level topic in each issue.

Of course, reading this magazine is possible only because authors have submitted work to be reviewed and published. If you feel you have something interesting to say, I encourage you to send it to us. You don't have to wait for a theme issue; we're always happy to consider research papers, industry reports, surveys, tutorials, opinion columns, or even letters to the editor on any Internet-relevant topic. (See our author guidelines at www.computer.org/internet/author.htm for more information.)

Hopefully, interesting weather will make for an interesting magazine. ☐