Joseph Hardin: NCSA Mosaic

Charles Severance

Joseph Hardin describes the emergency of Mosaic and the rise of the browser.

Twenty years ago, the Web and Internet were transformed from a medium used primarily by academics and researchers to one used by the general public. The Mosaic Web browser helped kick-start this evolution by making it very simple for users to download and install a browser and experience the Web through a simple and elegant interface on their Unix, Windows, or Macintosh computers.

Although Mosaic wasn't the first browser, it was the first that had a primary goal of ease of installation across all major computing platforms. Mosaic came from a culture of building user-friendly networking tools at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign. In an earlier Computing Conversations column ("Larry Smarr: Building Mosaic," Apr. 2013, pp. 6–8), I spoke with Larry Smarr about NCSA's culture.

In 2008, I met with Joseph Hardin to talk about his role as manager of NCSA's Software Development Group (SDG) in the early 1990s and the genesis, growth, and impact of the NCSA browser that became Mosaic.

To view the full interview, visit www.computer.org/computingconversations.

BEFORE MOSAIC

Although NCSA's official purpose was to deploy shared supercomputing resources over the NSFNet, there was an intense interest back in the early 1990s in how to make the use of networked resources as simple as possible and to broaden the population of those involved in computing and networking:

> What I thought was interesting was how people were using these new technologies to work together. We started out working with tools that supported simulation and computations on the main supercomputing systems. Larry Smarr recognized from the beginning—and we all loved the idea—that these small little things on the desktop were really gateways to the big machines in the background and that all of this would turn into one cloud behind the screen. We knew we needed to figure out how to get the user involved as much as possible.

As they built easy-to-use tools to give researchers access to central resources, it was a natural step to move into building tools to help those researchers share materials and work with each other:

> It's an easy extension to think about collaborative technologies in the large. How do people work together? Not only with these tools but also with simple communications like email, papers, datasets that they want to share. Initially, our interest was in synchronous tools for collaboration. We were building something called NCSA Collage, which was a set of tools that worked

Published by the IEEE Computer Society

across the three platforms—something for the Unix people, the Windows environment, and the Macintosh. That was part of the underlying culture at NCSA: we wanted to make tools available to as large a community as possible.

COLLAGE SHOWS THE PATH

NCSA Collage's goal was to allow synchronous sharing of images, data, papers, and applications on 1990s hardware and networks. The team initially saw the browser as just another potential component in their Collage system, something to allow shared synchronous viewing of Web documents:

> That's the context in which Dave Thompson, the lead X-Windows developer for the Collage tool, pulled down one of the early Web browsers. He went through the effort of getting it working and brought it in and showed it to Marc Andreessen and me. Both of us looked at the screen: Dave described what he had in front of us, and we said, "We can do better than that—it's a complicated system, and the interface looks terrible." Dave said that it was a real pain for him to download it, compile it, and get it working, and it only worked on an X-Windows box. Wouldn't it be cool if it worked across all three of the boxes and was plug-and-go like the rest of our tools?

Marc and Eric Bina immediately started development of the X-Windows version of NCSA Mosaic. They decided to make the source code freely available from the beginning of the project:

> This was before we really understood what was meant by "open source," but we wanted everybody to be able to take the software and do whatever they wanted with it. We weren't concerned with commercial advantage; we were more interested in it being open and people being able to make contributions back to the code and taking the code and doing whatever they wanted to do with it. We just put it all into the public domain.

The first X-Windows version of Mosaic came out in early 1993, and the response was immediate. It was easy to download and install, and because a rapidly growing number of existing websites popped up seemingly overnight, it felt like the world was bursting with new content:

> I remember an HP executive coming in one time. Marc and Eric had written a filter that took Unix documentation and turned it into HTML, changing all the references into links. They hit an HP site, and this executive said, "Where is this coming from?," because he was able to see all of his HP documentation there in the room at NCSA and navigate through it really easily. We said, "You have three or four folks back there that have put up HTTP servers and you might not know what those are yet. This is the kind of thing that's going to be really useful in the future for people who are trying to manage documentation in a distributed fashion." We went on with the story like that, and this guy was bouncing up and down in his seat. That was the kind of response we got with it.

Since Mosaic had come out of the Collage effort, the early versions maintained a connection to the Collage software:

> Early versions of Mosaic had a Collaborate button at the top, which would let you pull in something from a synchronous Collage session. The idea was that you could work synchronously and use the browser to pull something into the Collage session, or vice versa.

Once the X-Windows version of Mosaic was completed and released, the next step was to build the complimentary Windows and Macintosh versions of Mosaic:

> Tom Redman was the lead for the Macintosh version of Mosaic, but Aleks Totic—who was an excellent developer—did most of the development and frequently was ahead of the other people working on various versions of Mosaic, especially on the Mac. Chris Wilson and Jon Mittelhauser worked on the Windows version.

Pull Quote Here

THE BIG TIME

By early 1994, the general public was about to "get on the Web":

> All of a sudden, we had a full suite of Mosaics that could work across X-Windows, Macintosh, and Microsoft Windows. That's the point where the president of the Internet Society said we had "fired the shot heard around the world."

Once the doors to the Web were thrown open, the next question was how it would affect society:

> We were convinced deep down that all the new technologies and the digitalization of the world was going to make a huge difference, but we weren't exactly sure how. When people came to us early on in the Mosaic experience and said, "We want to commercialize this and do this with it or do that with it," we could only say, "We're not sure."

By mid-1994, commercial efforts started ramping up. Marc Andreessen

and others formed the Mosaic Communications Corporation (later renamed Netscape) to build a commercial Web browser and server. Bill Gates quickly pivoted Microsoft development to add native TCP/IP support in Windows as well as bundle the Microsoft Internet Explorer Web browser into Windows 95:

> It wasn't until the Netscape effort started up that there was sufficient energy and resources to really crank up a group of x-hundred developers in a matter of months. They were almost immediately overshadowed by the effort that Microsoft put into it. I remember one of the Netscape guys saying that he had just come back from a meeting in Seattle and that Microsoft now had 2,000 developers working on a browser. This was when Netscape was at the top of its game. He realized at that point that Netscape was going to have some problems.

As Netscape and Microsoft battled for market control, those who had created the Web—Tim Berners-Lee and Robert Cailliau—and those building open source browsers became concerned that the success and popularity might lead to a situation where browsers, servers, and HTML itself became proprietary technologies:

> We always felt that there should be more than one browser because we were interested in standards and openness. If there were only one, then that company gets to determine the standards. There were all kinds of hassles early on about putting in different features and the browsers driving the standards rather than the standards driving the browsers. We encouraged diversity.

Berners-Lee and others formed the World Wide Web Consortium (W3C) in October 1994 to guide and drive an open and standards-based approach to the evolution of Web technologies. By the end of 1994, Microsoft was shipping the beta releases of Windows 95:

> There was a feeling very early on that this was going to be a real gas. The response was just so immediate. If you go back and ask people sitting in front of machines in 1993 or 1994 if they remember the first time they ran Mosaic or used a browser if it wasn't Mosaic, the vast majority of them remember it, that epiphany.

While the development of the Web has had many critical moments, what happened in 1994, including the release of Mosaic on X-Windows, Microsoft Windows, and Macintosh, was essential to bringing the Internet to the widest possible audience.

Charles Severance, *Computing Conversations column editor and* Computer*'s multimedia editor, is a clinical associate professor and teaches in the School of Information at the University of Michigan. Follow him on Twitter @drchuck or contact him at csev@umich.edu.*