Autodesk had decided Xanadu was an impractical project after all. They were dropping it, leaving the project homeless.

Ted kindly bought me an Indian lunch anyway, and then we went back to his office, which seemed to be an attic in a pyramid building on the Sausalito shore. It was full of copies of his books. I gave him the money I owed and he promptly gave me a second book, autographed. We talked about all manner of things, but not a lot about Autodesk.

After lunch Ted walked me to my car in the parking lot. I took out my 35-mm camera from the trunk to capture the moment. I asked Ted, with some embarrassment, if he would mind posing for my scrapbook. He replied, "Certainly, not at all. I understand completely." He then produced from his knapsack a video camera to shoot some video footage of me. Before he did, though, he held the camera at arm's length, pointed it at his head, and shot a little bit of himself explaining that this was Tim Berners-Lee he would be filming, and what the significance was. Ted explained to me that it was his objective to lead the most interesting life he could, and to record as much as possible of that life for other people. To which end he amassed a huge number of video clips, which were indexed with an image of his own head; that way, he could skip through, and whenever he saw his head he could listen for a description of the next clip to come.

The summer of 1992 had been a thrilling time for me. The Web was being seen and used in many more places, and more people were developing browsers for it. I looked over the logs showing the traffic that the first Web server, info.cern.ch, had been getting over the last twelve months. The curve showing the number of daily hits was a dramatic exponential, doubling every three to four months. After one year, the load had grown by a factor of ten.

CHAPTER 6

Browsing

By January 1993 the number of known servers was increasing faster, up to about fifty. The Erwise, Viola, and Midas browsers were generally available for use on the X Window system. Samba was working, though not complete, for the Mac. But to me it was clear there was growing competition among the browsers, even if it was on a small scale. Many of the people developing browsers were students, and they were driven to add features to their version before someone else added similar features. They held open discussions about these things on the www-talk mailing list, preserving the open social processes that had characterized Internet software development. But there was still an honorable one-upmanship, too.

One of the few commercial developers to join the contest was Dave Raggett at Hewlett-Packard in Bristol, England. He created a browser called Arena. HP had a convention that an employee could engage in related, useful, but not official work for 10 percent

of his or her job time. Dave spent his "10 percent time," plus a lot of evenings and weekends, on Arena. He was convinced that hypertext Web pages could be much more exciting, like magazine pages rather than textbook pages, and that HTML could be used to position not just text on a page, but pictures, tables, and other features. He used Arena to demonstrate all these things, and to experiment with different ways of reading and interpreting both valid and incorrectly written HTML pages.

Meanwhile, the University of Kansas had, independently of the Web, written a hypertext browser, Lynx, that worked with 80 x 24 character terminals. More sophisticated than our line-mode browser, Lynx was a "screen mode" browser, allowing scrolling backward and forward through a document. It had, like Gopher, been designed as a campus-wide information system, and the team joked that Lynxes ate Gophers. Lou Montulli, a student, adapted it to the Web and released a Web browser, Lynx 2.0, in March 1993.

Developing browsers had become a good vehicle for students and engineers to show off their programming skills. David Thomoson, a manager at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign, wanted students to take a crack at it. He downloaded Viola, got it running, and demonstrated its use with the CERN server to the rest of NCSA's Software Design Group.

Marc Andreessen, a student, and Eric Bina, a staff member, decided to create a browser for X. Eric was somewhat like Pei Wei, quietly programming the HTML code and making the thing work. Marc maintained a near-constant presence on the newsgroups discussing the Web, listening for features people were asking for, what would make browsers easier to use. He would program these into the nascent browser and keep publishing new releases so others could try it. He listened intently to critiques, almost as if he were attending to "customer relations." Nourished, it was said, by large quantities of espresso, he would fix bugs and add little features late at night in reaction to user feedback.

This was in total contrast to any of the other student developers. Marc was not so much interested in just making the program work as in having his browser used by as many people as possible. The was, of course, what the Web needed.

The resulting browser was called Mosaic. In February 1993 NCSA made the first version available over the Web. I tried it at CERN. It was easy to download and install, and required very little learning before I had point-and-click access to the Web. Because of these traits, Mosaic was soon picked up more rapidly than the other browsers. Mosaic was much more of a product.

It troubled me in a way that NCSA was always talking about Mosaic, often with hardly a mention of the World Wide Web. Perhaps it was just pure enthusiasm.

I was scheduled to give a presentation to the Fermi National Accelerator Laboratory (Fermilab) in Chicago in March, which had put up a server as SLAC had done. I decided I would visit NCSA as well, since it was only a few hours' drive away.

While in Chicago I met Tom Bruce, a stage manager turned systems administrator turned programmer who had recently cofounded the Legal Information Institute at Cornell University, to provide online legal information and law findings. He thought the Web was just what the institute needed to distribute this information to the legal community. He had realized that most lawyers used IBM PCs or compatibles, which ran the Windows operating system, and would need a browser. So he had written Cello, a point-and-click browser for Windows. It was at alpha release (an early test version) in March, and he had come to Chicago to give a talk to the legal community about it. For the first time, people could see the Web in its multicolor, multifont glory on the world's most widespread computing platform.

I found Tom in an auditorium just after he had finished his talk. His laptop computer was still on, with its screen projected onto a big movie screen at the head of the room. There he demonstrated Cello to me, the two of us sitting alone in this big

room looking up at this big image of the Web. He had multiple fonts, colors, and user-selectable styles. He used a dotted line around text denoting a hypertext link, which fit with Windows conventions. I found out in talking with him afterward that he had worked professionally with lighting and audiovisual equipment in the theater. I had done the same thing in an amateur way. We shared an enthusiasm for the vocation, and hit it off.

I asked Tom, and Ruth Pordes, my host at Fermilab and a source of honest wisdom, to come with me to meet Marc Andreessen and the folks at NCSA. Ruth drove us down across the seemingly interminable cornfields. As someone who had been living in Geneva, I was struck by a remarkable lack of mountains.

The three of us found the Software Development Group, though it was not in the imposing brick and green-glass buildings that housed most of NCSA, but in an annex to the oil-chemistry building. We met Eric, Marc, and the group's leader, Joseph Hardin, in a basement meeting room.

All my earlier meetings with browser developers had been meetings of minds, with a pooling of enthusiasm. But this meeting had a strange tension to it. It was becoming clear to me in the days before I went to Chicago that the people at NCSA were attempting to portray themselves as the center of Web development, and to basically rename the Web as Mosaic. At NCSA, something wasn't "on the Web," it was "on Mosaic." Marc seemed to sense my discomfort at this.

I dismissed this as a subject of conversation, however, and made my now-standard case for making the Mosaic browser an editor, too. Marc and Eric explained that they had looked at that option and concluded that it was just impossible. It couldn't be done. This was news to me, since I had already done it with the World Wide Web on the NeXT—though admittedly for a simpler version of HTML.

Still, I was amazed by this near universal disdain for creating an editor. Maybe it was too daunting. Or maybe it was just a bal-

ance between competing demands on developers' time. But it was also true that most were more excited about putting fancy display features into the browsers—multimedia, different colors and fonts—which took much less work and created much more buzz among users. And Marc, more than anyone, appeared interested in responding to users' wants.

I sensed other tensions as well. There was a huge difference in style among the three men, and each seemed to be thinking separately rather than as a team. Eric, the staffer, was quiet. Marc, the student, gave the appearance that he thought of this meeting as a poker game. Hardin was very academic, the consummate professor in a tweed jacket. He was interested in the social implications of the Web as well as the technology, and in sociological studies of the Web. For him Mosaic was a sequel to a project NCSA already had, a multimedia hypertext system called Collage.

To add to my consternation, the NCSA public-relations department was also pushing Mosaic. It wasn't long before the *New York Times* ran an article picturing Hardin and Larry Smarr, the head of NCSA, (not Marc and Eric!) sitting side by side at terminals running the Mosaic browser. Once again, the focus was on Mosaic, as if it were the Web. There was little mention of other browsers, or even the rest of the world's effort to create servers. The media, which didn't take the time to investigate deeper, started to portray Mosaic as if it were equivalent to the Web.

I returned to CERN uneasy about the decidedly peremptory undertones behind NCSA's promotion of Mosaic. NCSA quickly started other projects to get Mosaic onto PCs running Windows, and onto Macintoshes.

The rise of different browsers made me think once again about standardization. The IETF route didn't seem to be working. I thought that perhaps a different model would. I got more enthused about the idea during a seminar at Newcastle University in my

native England, organized by International Computers Ltd. The spring weather was wet and dark. We were bused through the rainy evening from the seminar to dinner. On the way back I sat next to David Gifford, who happened to be a professor at MIT's LCS. I told him I was thinking of setting up some kind of body to oversee the evolution of the Web. I wondered what kind of structure might work, and where to base it. He said I should talk to Michael Dertouzos about it. He explained that Michael was the director of LCS, and said he thought Michael might be interested in doing something. I expressed happy surprise, noted "mld@hq.lcs.mit.edu," and promptly e-mailed him when I got back to CERN.

I was further motivated by another Internet phenomenon that had recently taken place. The gopher information system at the University of Minnesota had started at about the same time as the Web. It was originally created as an online help system for the university's computing department and spread to become a campuswide information system that also allowed people to share documents over the Internet. Instead of using hypertext and links, it presented users with menus, taking them eventually to documents normally in plain text. I had found that some people, when they saw the Web, thought hypertext was confusing, or worried that somehow they would get lost in hyperspace when following a link. Of course, this could happen in gopherspace too, but computer users were familiar with menus, so the program didn't seem as foreign.

It was just about this time, spring 1993, that the University of Minnesota decided it would ask for a license fee from certain classes of users who wanted to use gopher. Since the gopher software was being picked up so widely, the university was going to charge an annual fee. The browser, and the act of browsing, would be free, and the server software would remain free to nonprofit and educational institutions. But any other users, notably companies, would have to pay to use gopher server software.

This was an act of treason in the academic community and the Internet community. Even if the university never charged anyone a dime, the fact that the school had announced it was reserving the right to charge people for the use of the gopher protocols meant it had crossed the line. To use the technology was too risky.

Industry dropped gopher like a hot potato. Developers knew they couldn't do anything that could possibly be said to be related to the gopher protocol without asking all their lawyers first about negotiating rights. Even if a company wrote its own gopher client or server, the university could later sue for infringement of some intellectual property right. It was considered dangerous as an engineer to have even read the specification or seen any of the code, because anything that person did in the future could possibly be said to have been in some way inspired by the private gopher technology.

At the March 1993 IETF meeting in Columbus, Ohio, held after the announcement, I was accosted in the corridors: "Okay, this is what happened to gopher. Is CERN going to do the same thing with the WWW?" I listened carefully to peoples' concerns and to what they said they would or would not find acceptable. I also sweated anxiously behind my calm exterior.

During the preceding year I had been trying to get CERN to release the intellectual property rights to the Web code under the General Public License (GPL) so that others could use it. The GPL was developed by Richard Stallman for his Free Software Foundation, and while it allowed things to be distributed and used freely, there were strings attached, such that any modifications also had to be released under the same GPL. In the fallout of the gopher debacle, there were already rumors that large companies like IBM would not allow the Web on the premises if there was any kind of licensing issue, because that would be too constraining. And that included the GPL.

CERN had not yet made up its mind. I returned from Columbus and swiftly switched my request, from getting a GPL to having