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JAVA TECHNOLOGY: AN EARLY HISTORY

Chances are, everything you know about Java technology is only a few years old. There's a good reason for that: On May 23, 1998 the technology officially celebrated its third birthday.

As part of the celebration, we interviewed several members of the Java technology team who have been around since the early days, and we put together this retrospective to share with the readers of java.sun.com. Join us on a stroll through history.

by Jon Byous

On May 23, 1995, John Gage, director of the Science Office for Sun Microsystems, and Marc Andreessen, cofounder and executive vice president at Netscape, stepped onto a stage and announced to the SunWorld^TM audience that Java^TM technology was real, it was official, and it was going to be incorporated into Netscape Navigator^TM, the world's portal to the Internet.

At that time, the entire Java technology team, not yet a division, numbered less than 30 people. It was the original members of this small group who created and nurtured a technology that would change the computing world.

The Set-Top TV You Never Saw

Java technology was created as a programming tool in a small, closed-door project initiated by Patrick Naughton, Mike Sheridan, and James Gosling of Sun in 1991. But creating a new language wasn't even the point of "the Green Project."

The secret "Green Team," fully staffed at 13 people, was chartered by Sun to anticipate and plan for the "next wave" in computing. Their initial conclusion was that at least one significant trend would be the convergence of digitally controlled consumer devices and computers.

This is a snapshot taken at a barbecue that James Gosling threw for some of the folks associated with the Green Team. From left to right they are: Al Frazier, Joe Palrang, Mike Sheridan, Ed Frank, Don Jackson, Faye Baxter, Patrick Naughton, Chris Warth, James Gosling, Bob Weisblatt, David Lavallee, and Jon Payne. Missing in action: Cindy Long, Chuck Clanton, Sheueling Chang, and Craig Forrest.

To demonstrate what they saw as a possible future in digital devices, the Green Team

locked themselves away in an anonymous office on Sand Hill Road in Menlo Park, cut all regular communications with Sun, and worked around the clock for 18 months. In the summer of 1992, they emerged with a working demo, an interactive, handheld home-entertainment device controller with an animated touchscreen user interface.

In the demo, the now familiar Java technology mascot, Duke, was shown waving and doing cartwheels on the screen. The device was called *7 ("StarSeven"), named after an "answer your phone from any extension" feature of the phone system in the Green Team office. Duke was actually a representation of the *7's "agent", a software entity that did tasks on behalf of the user.

*The original *7 device*

*A *7 display, showing one experimental user interface.*

The reason *7 was able to control a wide range of entertainment platforms and appliances -- while displaying animation -- is that it ran on an entirely new, processor-independent language. The language itself was created by Green Team member James Gosling specifically for *7. Gosling called the new language "Oak," after the tree outside his window. As the project gained momentum and started involving potential customers in the cable television industry, the Green team came out from hiding, occupied a large, attractive office building at 100 Hamilton Avenue in Palo Alto, and came to be known as FirstPerson.

Who Was Who
(Listed alphabetically)

Lisa Friendly -- FirstPerson employee, original member of the Java Products Group

John Gage -- Director of the Science Office, Sun Microsystems

James Gosling -- Green Team original, FirstPerson employee, original member Java Products Group, lead engineer and key architect of Java technology

Bill Joy -- Cofounder and vice president, Sun Microsystems, Inc., principal designer of the University of California, Berkeley, version of the UNIX® operating system

Jonni Kanerva -- Original Java Products Group employee, author

of *The Java FAQ*[1]

Tim Lindholm -- FirstPerson employee, original member Java Products Group

Scott McNealy -- chairman, president, and CEO of Sun Microsystems

Patrick Naughton -- Green Team member, FirstPerson cofounder

George Paolini -- Director of corporate marketing, Sun's Java Software Division

Kim Polese -- FirstPerson product marketing/P>

Lisa Poulson -- Original director of public relations for Java technology (Burson-Marsteller)

Wayne Rosing -- FirstPerson president

Eric Schmidt -- Former Sun Microsystems chief technical officer

Mike Sheridan -- Green Team member

The FirstPerson team was trying to find a market for a *7-type of device, and the TV set-top box and video-on-demand industries seemed to make the most sense. The team developed a new demo called MovieWood to demonstrate the underlying technology to that market. Unfortunately, those industries were in their infancy and still trying to settle on viable business models.

Welcome to the Internet, You Have Customers

James Gosling

"Back when we were FirstPerson, the Java technology-related stuff we were doing was built around networking, in very much an Internet style," says James Gosling. "We were pitching the cable companies on the idea that this is what your network should look like. It was interactive, and users could read and write information into the system. But the companies didn't want to lose that much control." It was too far ahead of its time, and the team, now numbering 70 people, was still searching for a target market.

"After we realized that there wasn't a business in digital cable television, we had a group meeting at The Inn at Squaw Creek near Lake Tahoe. We had to figure out what to do with this technology, or what to do with our lives." There, over the course

of three days, John Gage, James Gosling, Bill Joy, Patrick Naughton, Wayne Rosing, and Eric Schmidt had a group epiphany: why not the Internet?"

The newly popular Internet was exactly the type of network configuration that the FirstPerson team had envisioned for the cable TV industry.

The Internet was becoming popular as a way of moving media content -- text, graphics, video -- throughout a network of heterogeneous devices using HTML. Java technology had been designed in parallel to move media content across networks of heterogeneous devices, but it also offered the capability to move "behavior" in the form of applets along with the content. HTML alone could not do that, but it did set the stage for Java technology.

Gosling explains: "We had already been developing the kind of `underwear' to make content available at the same time the Web was being developed. Even though the Web had been around for 20 years or so, with FTP and telnet, it was difficult to use. Then Mosaic came out in 1993 as an easy-to-use front end to the Web, and that revolutionized people's perceptions. The Internet was being transformed into exactly the network that we had been trying to convince the cable companies they ought to be building. All the stuff we had wanted to do, in generalities, fit perfectly with the way applications were written, delivered, and used on the Internet. It was just an incredible accident. And it was patently obvious that the Internet and Java were a match made in heaven. So that's what we did."

Build a Better Browser

The team returned to work up a Java technology-based clone of Mosaic they named "WebRunner" (after the movie *Blade Runner*), later to become officially known as the HotJava^{TM} browser. It was 1994. Daily, momentum behind the new vision grew. WebRunner was just a demo, but an impressive one: It brought to life, for the first time, animated, moving objects and dynamic executable content inside a Web browser. That had never been done.

WebRunner flyer: click to enlarge.

Two Demos That Changed the World

One day early in 1995, John Gage, director of Sun's Science Office, stuck his head in Gosling's office and said, "James, I need some cable, do you have any?" Gosling grabbed some from the team's stockpile. "Now, I need a couple of desktop systems. Can I borrow these?" No problem. Gosling offered to help carry them down to the car, asking along the way, "John, what are you doing with these systems?"

Gage answered that he was headed to the Technology, Entertainment and Design Conference over the hill in Monterey. He had been invited to give a talk at this exclusive "Hollywood-meets-Silicon-Valley" gathering of Internet and entertainment professionals. He had downloaded WebRunner and was going to demonstrate it to the audience. Gosling, horrified at the prospect of the still-rough WebRunner crashing in a major public demonstration, jumped in Gage's Volvo full of gear and rode along as his "demo dolly."

Gosling spent the next 30 hours setting up a network link and troubleshooting the demo. As the talk began, Gosling noticed that many people were only casually paying attention. After all, what was so exciting about a new language driving a page of text and illustrations in a clone of Mosaic?

A commercial applet, similar to the 3D molecule applet that Gosling debuted. Click, hold, and drag your mouse over the image to rotate the molecule.
[Credit: Cherwell Scientific]

Then Gosling moved the mouse over an illustration of a 3D molecule in the middle of the text. The 3D molecule rotated with the mouse movement. Back and forth, up and around. "The entire audience went `Aaaaaaah!'" says Gosling. "Their view of reality had completely changed because it MOVED." Now everyone was paying close attention.

Next, Gosling and Gage pushed the audience over the edge with an animated line-sorting algorithm that Gosling had written.

In each of three sets of horizontal lines of random lengths, the demo sorted the collection by size, from shortest to longest, by actually moving them up and down in the browser. The audience had never seen anything but static images in a browser before this: The lines were moving, as if being sorted by unseen hands!

One example from the three sorting applets that Gosling demonstrated using WebRunner. Click image to begin.

Suddenly, everyone in the room was rethinking the potential of the Internet. Far from the crash-and-burn scenario Gosling had first envisioned, his demo had jolted a very influential audience off their seats, and they were delivering enthusiastic applause. And within this technology-entertainment crowd, word would spread quickly.

One month later, the team was ready to make WebRunner and the binary code available over the Internet in a "private/public" download. They wanted the code to be tested by their friends and a small, informal network of developers.

They promoted the release via e-mail, which was cheap and quick. "We were just a little lab group that was flinging this thing over the wall," says Gosling.

Going Public

By March 1995, there were still only seven or eight binary copies of what they called

"1.0a" outside of Sun. The team was getting ready to post a "full public" alpha version ("1.0a2") of the Java source code on the Internet.

Lisa Friendly

"We released the source code over the Internet in the belief that the developers would decide for themselves," said Lisa Friendly. The team knew that releasing code to developers for free is one of the fastest ways to create widespread adoption. It's also a great way to enlist the help of the development community to inspect code and find any overlooked bugs.

So the team set up an Internet address and, with their hearts pounding, they pushed ENTER, sending the Java source code through the net and out into the world.

At first, the team all jumped for joy when someone would download the release. "Seven downloads! Look, somebody in Australia is downloading now, and we don't even know who it is--that's eight!" Nine. Ten. Soon dozens. Now, word was getting out over the net and feedback was coming back in from developers.

In just a few months, the downloads began to surge into the thousands. The team had to reset their vision of success.

Gosling says, "I had to pick a number that represented success for Java. I said, OK, if we reached 10,000 downloads of this first release -- 10,000 people kicking the tires -- we would be a total, blow-the-doors-off success."

Download 10,000 didn't take as long as anyone expected, not even James. And, along with that milestone, the spiraling volume of email inquiries and continuous downloads was beginning to tax the team's Internet connection. They constantly needed more bandwidth to satisfy the market's interest.

The Java technology team had taken proud note of each day's downloads and crafted comprehensive answers to practically all e-mail questions. "Developers would receive two-page technical answers to their problems the next day," said Lisa Friendly. "At first it was maybe 20 e-mails a day."

Friendly continued: "Sometimes, in their enthusiasm to help a developer with a technical question, two or three team members were answering the same e-mail. So we decided that each week, one team member would have the job of answering all incoming emails." At first, it was a manageable solution as a temporary task added to their regular work. But by the time each team member had taken a one-week turn at answering e-mails, the task had become a full-time, week-long job for whomever's turn it was.

Team member Tim Lindholm was running the Java technology-related mailing lists and was regularly receiving over 2000 emails a day. "I was getting tons of mail because I was co-webmaster and ran the mailing lists, which had tens of thousands of people subscribing to them." If he left for any reason for more than a couple of days, he would return to see from six to eight thousand e-mails on his system.

Gosling set up an interactive system that automatically sent a polite return e-mail for each one received. Finally, the full-time job of support went to team member Jonni Kanerva, a linguist and software developer himself. He later published his e-mail responses to developers in the book, *The Java FAQ*."[1]

The hours were long, just coping with code development. Then came the e-mails and constant system upgrades -- across each of the technology's multiple platforms, of course. Then came the press, the interviews, the promotional requirements, and the speaking engagements. Then Sun would call and ask if James could go to China the following week.

"We were workaholics, complete nutcase maniacs." said Lindholm. "Still, many of us tend to create scenarios that let us work like dogs, because that's how we want our lives to be. It's irritating when someone says to back off, take a break, and don't work so hard."

For the original players on this team, "working hard" doesn't begin to describe their days and nights.

The New Bandwidth Hogs of Sun

Even though the team had a shared T1 line and an official java.sun.com address, the bandwidth wasn't enough for the growing Java software market's demands. Developer complaints about not being able to download the code started coming in frequently. Some even accused the team of purposely withholding the now in-demand code. "We had simply saturated the line," says Gosling.

Soon Sun realized that the Java technology team's popularity was quickly and haphazardly outpacing its own carefully orchestrated popularity, with virtually no marketing budget or plan. The undeniable proof was in the Web hits. And then it happened.

Black and White, and Read All Over

San Jose Mercury News,
March 23, 1995
Click to enlarge

Lisa Friendly told the story: "It was Wednesday, March 22, 1995, and Lisa Poulson had arranged for the San Jose Mercury News to write a story on Java technology based on our upcoming official announcement. We all wore lots of hats back then. In addition to working on some developer and end-user docs, I was responsible for designing the new Web site, java.sun.com. Lisa Poulson or Kim Polese had come by my office to tell me that we needed to have something linked with www.sun.com by Sunday when the article would run.

Friendly continues: "I thought, no problem. This gives me four days to get it ready. Weekends were just additional workdays back then. In Internet time that was a lifetime. I had leisurely started to put it together on Wednesday while working on my other projects. Then on Thursday morning at 7:30, I went to the driveway to pick up the paper and saw the front page of the Mercury. There it was. Uh-oh. Better get to the office in a hurry."

Not only was the story supposed to run on Sunday, but it was expected to run in the business section, not the top half of the Mercury's front page. Friendly recalls: "I rushed into the office and worked as fast as I could. But people kept calling and knocking on my door to ask if I knew the story had run with a URL for which there were no Web pages! You know the term `Positive Stress'? I was focused and energized, but at the same time I thought I was going to become physically sick at my keyboard." The Web site was up and running in a couple of hours.

First Home Page for
java.sun.com:
Click to enlarge.

The front-page story clearly positioned the new, soon-to-be-announced Java technology as The Next Big Thing. It even included a quote from Netscape's Marc Andreessen, giving the nod to Java technology as "great stuff." The PR team had done its job, but the newspaper took the publicity beyond all expectations. It brought an immediate swarm of calls and inquiries from the press.

The rest of the world, the non-programmers, were suddenly taking notice, and almost overnight, the Java technology team was sitting at the table with the grown-ups.

Sorry to Steal the Show, Dad

Imagine the scene: The public announcement of Java technology has been scheduled as a part of the keynote speech at the SunWorld show kick-off. The announcement would have a brief, but exclusive, place in the Sun spotlight. Other than that, Java technology didn't have much of a role to play in this well-established UNIX$^{®}$ showcase for UNIX customers.

But then an unexpected turn of events occurs.

It is about 4 a.m. in a Sheraton Palace hotel room down the street from the convention center. Sun's Eric Schmidt and George Paolini are shaking hands with Netscape's Marc Andreessen on an agreement to integrate Java technology into the omnipresent, omnipotent Navigator browser. It had been a long session of tough words and big numbers, but in the end, Andreessen agreed to step out on stage during the morning's keynote speech and reveal the surprise agreement as part of the Java technology announcement.

Most of the Java team didn't know the agreement has taken place until the moment Andreessen and the Sun execs walk on stage. The air was electric throughout the room. The prospect of Navigator being able to open these new, mysterious, and simple Java technology-based applets on any Web page from any platform was unbelievable news to this audience. Andreessen was on stage for less than three minutes, and once again, an influential audience of technologists and the press is pounding out excited applause, knowing they are witnessing the beginnings of something very big for the future of the Internet.

Epilogue

A lot of synergistic things have happened in Internet and enterprise technology in the last few years, and these are just the beginning: JDK, the sandbox, applets, thousands of Java technology-oriented startups, over a thousand books on Java technology, JavaBeans architecture, Java Studio, Netscape Communicator, thousands of Internet service providers, 60 million Internet users, 56K and cable modems, electronic commerce, servlets, Java Foundation Classes, Enterprise JavaBeans^{TM} components, JavaOS for Business^{TM}, and commitments from major players such as IBM.

More than merely a series of software products and events, the list above is an indication of how fast this technology has grown in the last several years. Java technology is a major computing environment now, a river that has flooded its banks and is now coursing just about everywhere across industries and the enterprise.

In the months that followed the original SunWorld announcement, Sun's stock price soared, partially attributable to Java technology. By the end of Java technology's first full year, the JavaSoft division had signed 38 licensees and attracted 6000 developers to its own trade show, the first JavaOne Developer Conference. By the end of the second year, JavaSoft had signed nearly 100 licensees and the JavaOne conference had attracted 10,000 developers.
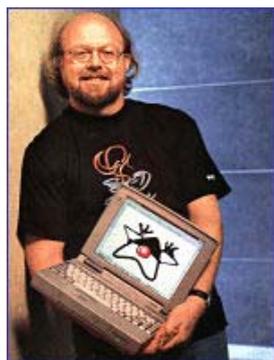
James and Duke

At the celebration of Java technology's third birthday, the renamed Sun Java Software Division employed 800 people, supported over 150 licensees and many hundreds of thousands developers worldwide. It has hosted 15,000 JavaOne attendees (the world's largest gathering of programmers ever), regularly matched its former yearly goal of 10,000 JDK downloads in a single day, and boasted a very busy T3 line of its own, with backups.

Since its introduction in May 1995, the Java platform has been adopted more quickly across the industry than any other new technology in computing history. All major computing platform vendors have signed up to integrate Java technology as a core component of their products. What got the Java platform from there to here appears to have been sheer momentum. As Lisa Friendly said, "The developers really made all this happen. It wasn't the hype."

"The Java platform is dwarfing any other API or programming environment out there," Sun CEO Scott McNealy told an audience at a industry gathering. "Java has become the language, and the platform, and the architecture for computing on the network."

Press Accounts of the Birth of Java Technology

- A Brief History of the Green Project by James Gosling
  (http://java.sun.com/people/jag/green/index.html)
- The Story of the Java Platform on the java.sun.com Web site
  (http://java.sun.com//nav/whatis/storyofjava.html)
- Java: The Inside Story by Michael O'Connell in SunWorld Online
  (http://www.sun.com/sunworldonline/swol-07-1995/swol-07-java.html)
- The Java Saga by David Bank in Wired
  (http://www.wired.com/wired/archive/3.12/java.saga.html)

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[1] *The Java FAQ,* Jonni Kanerva, Addison-Wesley, 1997. For more information on this book, see http://java.sun.com/docs/books/faq/.

[This page was last updated Apr-12-2003]