SUN MICROSYSTEMS: JUMPING FOR JAVA

In the past, power and success in the computer industry all boiled down to who controlled the key technological choke points...Customers don't want that kind of industry domination anymore...That's why Java is different. Sun is leading it, but by design nobody really owns it.

—Irving Wladawsky-Berger, IBM's Internet czar and chief Java strategist

Scott McNealy, CEO of Sun Microsystems, was thinking about the future as he walked back to his office. He had just met with Alan Baratz, president of Sun's JavaSoft subsidiary, to discuss Sun's next move regarding Java, the company's platform-independent programming language. Since its launch in May 1995, Java had been a rousing success. It was adopted more quickly across the software industry than any other new technology in computing history. Realizing its potential, many of Sun's competitors, including Microsoft, had rushed to license Java. Sun currently had over 200 licenses outstanding and 900,000 software developers working on new applications.

Java's proliferation had quickly convinced Microsoft that the "write once, run anywhere" software represented a real threat to its entrenched Windows monopoly. McNealy had boasted about the demise of Windows and how Java would be running on everything from cell phones to household appliances. Sun held to the belief that large networks of Java-enabled devices powered by massive servers would someday render the PC obsolete. Microsoft began to move aggressively to counter Sun's every move. They were able to persuade thousands of software developers to use Microsoft's version of Java. Sun continued to win the battles, but who would win the war?

As McNealy sat down in his office, he contemplated Sun's next move. Java represented a major part of Sun's future success. Its continuing development would spur sales growth for Sun's Internet servers, software tools, and microchips. In the past Sun's tall promises, late releases, and tight grip on Java development had allowed Microsoft to counter Java. Now other partners were beginning to follow suit. What began as collaborative agreements with partners to make Sun's Java the standard programming language was quickly evolving into a struggle for control over development. McNealy considered the consequences of giving up some of this control.

SUN MICROSYSTEMS

Sun is regarded as "the last standing, fully integrated computing company, adding its own value at the chip, [operating system], and systems level." The company first made a name for itself by making high-powered

1 John Doerr of Kleiner Perkins, quoted in David Kirkpatrick, "Meanwhile, Back at Headquarters," Fortune, October 13, 1997, p. 82.
computer workstations, but is now better known for building the servers and software that power the Internet. Sun's major products include the UltraWorkstation, Solaris Operating Environment, Sparc Microprocessor, and Java and Jini Connection Technologies (see Appendixes 12.1 and 12.2 on pages 320 and 321). In 1996 Sun was generating nearly $1.3 billion in revenues from server sales. Driven by the rapid growth of the Internet and increased demand for networked systems, the server market reached quarterly sales of over $16 billion in 1998 (see Exhibit 12.1). As Sun's server business flourished, intense competition and shrinking margins began to erode the company's core workstation business. Despite these pressures, the company still managed to increase product revenues by $856 million or 11 percent in 1998, following a 21 percent growth year in 1997 (see Exhibitions 12.2 and 12.3).

Sun was founded in 1982 by a group of four young pioneers brought together by a shared vision of decentralized, heterogeneous computing systems. In 1987 Sun adopted the slogan, "the Network is the Computer" to promote this open-systems philosophy. McNealy described Sun's vision as:

> a networked computing future driven by the needs and choices of the customer. It is a vision in which every man, woman, and child has access to the collective planetary wisdom that resides on the network...Our role is to make the most of opportunity by delivering open, affordable, and useful products to help as many people as possible share in the power of the network around the world.

EXHIBIT 12.1 Server Industry Market Share

<table>
<thead>
<tr>
<th>Vendor</th>
<th>4th Quarter 1997</th>
<th>Market 4th Quarter Share (%)</th>
<th>4th Quarter 1998</th>
<th>Market Share</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>$5,234</td>
<td>31%</td>
<td>$4,553</td>
<td>28%</td>
<td>– 13%</td>
</tr>
<tr>
<td>Compaq</td>
<td>1,430</td>
<td>8</td>
<td>2,072</td>
<td>13</td>
<td>45</td>
</tr>
<tr>
<td>Hewlett-Packard</td>
<td>1,782</td>
<td>11</td>
<td>1,886</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Sun Microsystems</td>
<td>1,275</td>
<td>8</td>
<td>1,508</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Fujitsu</td>
<td>766</td>
<td>5</td>
<td>776</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>NEC</td>
<td>630</td>
<td>4</td>
<td>638</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Dell</td>
<td>319</td>
<td>2</td>
<td>603</td>
<td>4</td>
<td>89</td>
</tr>
<tr>
<td>Siemens</td>
<td>381</td>
<td>2</td>
<td>599</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td>Hitachi Ltd.</td>
<td>693</td>
<td>4</td>
<td>500</td>
<td>3</td>
<td>– 28</td>
</tr>
<tr>
<td>SGI</td>
<td>392</td>
<td>2</td>
<td>271</td>
<td>2</td>
<td>– 31</td>
</tr>
<tr>
<td>Others</td>
<td>4,038</td>
<td>24</td>
<td>2,796</td>
<td>17</td>
<td>– 31</td>
</tr>
<tr>
<td><strong>Total market</strong></td>
<td><strong>$16,940</strong></td>
<td><strong>100%</strong></td>
<td><strong>$16,202</strong></td>
<td><strong>100%</strong></td>
<td>– 4</td>
</tr>
</tbody>
</table>


EXHIBIT 12.2  Sun Microsystems Revenues

Sun Revenues (Products), 1996

Source: Business Week, January 22, 1996.
### EXHIBIT 12.3  Abbreviated Financial Statement

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years Ended June 30,</strong></td>
<td><strong>$000s</strong></td>
<td><strong>$000s</strong></td>
<td><strong>$000s</strong></td>
</tr>
<tr>
<td><strong>Net revenues:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Products</td>
<td>$8,603,259</td>
<td>$7,747,115</td>
<td>$6,392,358</td>
</tr>
<tr>
<td>Services</td>
<td>1,187,581</td>
<td>851,231</td>
<td>702,393</td>
</tr>
<tr>
<td><strong>Total net revenues</strong></td>
<td><strong>9,790,840</strong></td>
<td><strong>8,598,346</strong></td>
<td><strong>7,094,751</strong></td>
</tr>
<tr>
<td><strong>Growth</strong></td>
<td>13.9%</td>
<td>21.2%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Cost of sales:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Products</td>
<td>3,972,283</td>
<td>3,790,284</td>
<td>3,468,416</td>
</tr>
<tr>
<td>Services</td>
<td>721,053</td>
<td>530,176</td>
<td>452,812</td>
</tr>
<tr>
<td><strong>Total cost of sales</strong></td>
<td><strong>4,693,336</strong></td>
<td><strong>4,320,460</strong></td>
<td><strong>3,921,228</strong></td>
</tr>
<tr>
<td><strong>Gross margin</strong></td>
<td>52.1%</td>
<td>49.8%</td>
<td>44.7%</td>
</tr>
<tr>
<td><strong>Research and development</strong></td>
<td>1,013,782</td>
<td>825,968</td>
<td>653,044</td>
</tr>
<tr>
<td><strong>Selling, general, and administrative</strong></td>
<td>2,777,264</td>
<td>2,402,442</td>
<td>1,787,567</td>
</tr>
<tr>
<td><strong>Purchased in-process R&amp;D</strong></td>
<td>176,384</td>
<td>22,958</td>
<td>57,900</td>
</tr>
<tr>
<td><strong>Operating income</strong></td>
<td>1,130,074</td>
<td>1,026,518</td>
<td>675,012</td>
</tr>
<tr>
<td><strong>Margin</strong></td>
<td>11.5%</td>
<td>11.9%</td>
<td>9.5%</td>
</tr>
<tr>
<td><strong>Gain on sale of equity investment</strong></td>
<td>—</td>
<td>62,245</td>
<td>—</td>
</tr>
<tr>
<td><strong>Interest expense, net</strong></td>
<td>(46,092)</td>
<td>(32,444)</td>
<td>(33,862)</td>
</tr>
<tr>
<td><strong>Income before income taxes</strong></td>
<td>1,176,166</td>
<td>1,121,207</td>
<td>708,874</td>
</tr>
<tr>
<td><strong>Provision for income taxes</strong></td>
<td>413,304</td>
<td>358,787</td>
<td>323,486</td>
</tr>
<tr>
<td><strong>Net income</strong></td>
<td><strong>$ 762,862</strong></td>
<td><strong>$ 762,420</strong></td>
<td><strong>$ 476,388</strong></td>
</tr>
<tr>
<td><strong>Other data:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total assets</td>
<td>$5,711,062</td>
<td>$4,697,274</td>
<td>N/A</td>
</tr>
<tr>
<td>Total debt</td>
<td>$ 47,169</td>
<td>$ 100,930</td>
<td>N/A</td>
</tr>
<tr>
<td>Total stockholders' equity</td>
<td>$3,513,628</td>
<td>$2,741,937</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated number of stockholders</td>
<td>341,000</td>
<td>289,000</td>
<td>N/A</td>
</tr>
<tr>
<td>Total employees at year end</td>
<td>26,343</td>
<td>21,553</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Source: Company SEC filings.*
McNealy’s pugnacious attitude helped define Sun’s culture in its early years. He promoted a coach/team-like atmosphere in which head-to-head competition was encouraged, and was quoted as saying, “If everyone believes in your strategy, you have zero chance of profit.” Those who worked for him saw him as an inspirational corporate rebel who “made you want to win one for the gipper.” Those who competed against him recognized his belligerent charm; one anonymous competitor told an industry publication, “Sun sells UNIX, a boring techie thing. You think if not for McNealy they’d be so successful and have so much name recognition?\[4\]

THE BIRTH OF JAVA\[4\]

With the technology market booming in the early 1990s, a group of Sun’s top computer programmers grew restless and thought about leaving the company. Included among them were programming gurus James Naughton and James Gosling. Keenly aware of their value to Sun, McNealy sat down with the two and made them an offer they couldn’t refuse: The company would give them a team of top software developers with the freedom to pursue whatever they wanted. The only requirement was to make something "cool."

Rising to the challenge, Naughton and Gosling went into self-imposed exile with their new team, code-named Green, at a site miles from Sun’s headquarters in Palo Alto, California. There they were no longer distracted by the everyday workings of Sun’s office. The team was referred to as a modern-day version of the scientists on the Manhattan Project. They were intrigued with potential opportunities in the consumer electronics market that could make it possible for household consumer devices to communicate with each other. With this in mind, they set to work trying to create a language that would allow TV devices, such as a universal remote control and an interactive set-top box, to interact seamlessly. Meeting with little success, Gosling realized that the usual computer languages were too bulky and unreliable to program these types of devices. He began to develop a new, streamlined language called Oak, named for a tree outside his window. The Green project continued to evolve into a Sun-owned company called FirstPerson.

In 1993 the National Center for Supercomputing Applications introduced Mosaic, and the World Wide Web was born. FirstPerson recognized that the seamless programming language it had been unsuccessfully trying to apply to consumer electronics was well suited for online media. Sun began to market the product instead of part of a device. By March 1995 Oak had become known as Java.

WHAT IS JAVA?

Java is software for writing programs that can run on any device connected to a network. Unlike other programming languages such as C, C++, Pascal, or BASIC, which depend on an underlying operating system, Java can run on any operating system and on any computer. This unique versatility means that

---


Copyright 2002 – The McGraw-Hill Companies, Srl
people working on completely different operating systems can work on the same document or play the same
game as long as the program is written in Java. This is a fundamentally different vision of computing from the
PC, and fits perfectly with the World Wide Web's way of doing things. In essence, the Web is what Java was
designed for—to be a network application—fitting into Sun's vision of the network as the computer (see
Exhibit 12.4).

JAVA IN THE MARKETPLACE

Java was poised to affect the technology market in four important ways:

Versatility

Java's "write once, run anywhere" capability would enable programmers to create a single piece of software
that could be understood by any major operating system. This would significantly cut development time for
individual programs and expand the market potential of a program. From a programmer's perspective, this
meant that all operating systems would be equal. Computers would interpret each line of Java code
separately and translate it for the operating system. In turn, the operating system would translate the code
for the microprocessor chip.

Savings

Java would not only cut development time, but also help users save money. Java would significantly reduce
creative, distribution, and transfer costs because its applications run on any kind of computer.

EXHIBIT 12.4 An Architectural View of Java and Jini Technology

<table>
<thead>
<tr>
<th>Jini Services</th>
<th>JAVA Spaces</th>
<th>Other Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jini:</td>
<td>Lookup</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discovery/Join</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JAVA</th>
<th>JAVA</th>
<th>JAVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solaris</td>
<td>Mac</td>
<td>Windows</td>
</tr>
<tr>
<td>Sparc</td>
<td>PPC</td>
<td>X86</td>
</tr>
</tbody>
</table>

Competition

Java would make it possible for a new class of cheap network computers to compete with the elaborate Wintel operating system. According to McNealy, this was a pipe dream come true: "We always thought we were onto something with Java — that it was our one big chance to challenge Microsoft and change the economics of the business."5

Providing "the Dot in .Com"

With the dawning of the Internet age, perhaps the most important implication of Java is that it would adopt the role of the language best suited to the Internet. By nature, Java doesn't discriminate against specific machines and is inherently virus proof.

EXPLOITING JAVA

If the standard gets fragmented then Java fails.6

—Ken Morse, chief technology officer of Power TV, Inc.

Alliances and Partnerships

To exploit Java's full potential, Sun entered into a series of alliances and partnerships. In its quest for ubiquity and market acceptance, rather than profitability, Sun killed its own HotJava browser to enter a licensing agreement with Netscape. In September 1995 Netscape launched Navigator 2.0 with support for Java applets, giving Java unprecedented market penetration and a major presence on the Web. Several companies, including Oracle, Novell, and IBM, recognized Java's potential for network computing in the Internet age, and embraced Java, hoping it would blunt Microsoft's hegemony. Appendix 12.3 on page 321 lists the strategic alliances in which Sun was engaged.

Microsoft had initially dismissed Java's potential as overblown, but quickly reversed its position. In March 1996 Microsoft licensed Java for its Internet Explorer 3.0, which touted the best Java performance of any browser at the time. However, Sun's victory was limited. When Microsoft launched Internet Explorer 4.0 in 1997, it contained a Java source code optimized for Windows. This meant that certain Java applets would run smoothly only on Internet Explorer. Java as a standard universal language was under fire.

The Creation of JavaSoft

In January 1996 Sun announced the development of a new strategic business unit named JavaSoft. Its mission was "to develop, market, and support Java technology and products based on it." The overarching goal was to work toward building Java into an OS. This involved decreasing Java's association with UNIX

---

6 Power TV, Inc., is a consumer software toolmaker.
and making it "cross-platform" as the architecture promised. JavaSoft was staffed by 100 people broken into developer services, products, and marketing. They received additional help from 200 volunteers working on developing the Java platform. By 1998, however, JavaSoft began to turn its sights away from platform development, moving to office application development, much to the chagrin of large and small third-party developers such as IBM and WebLogic.

RECOGNIZING JAVA'S WEAKNESSES

Sun's vision for the office application market was that all kinds of programs written in Java would reside on networks. Instead of a PC, offices would use bare-bones network computers. When employees needed to use an application, such as a word processor, they would download the application from the network, use it, and then the program would disappear. By centralizing software rather than duplicating it on individual terminals, businesses would reduce the costs of upgrading and fixing mismatched or corrupted systems.

Implementing this vision was not easy for Sun. Customers found that Java office applications had limited functionality and were unstable. The Java Virtual Machine, an "environment" that sat between the Java program and the machine it was running on, did not behave consistently across all computing platforms. This make it difficult for Java to live up to its versatility and speed claims. Java's "write once, run anywhere" technology meant that applications catered to the lowest common denominator. Thus, Java applications tended to run slower than programs honed for platforms like Macs or Windows. Additionally, many companies had already made a significant investment in the Windows platform and were not receptive to rewriting all of their software to be compatible with Java.

THE FUTURE OF JAVA

The WebTone

Sun continues to pursue its mission to make Java the platform for a "platformless" technology. The company's future strategy is to supply all of the hardware and software necessary to build a 100 percent reliable Internet system—much like the dial tone offered by telecom companies. McNealy explains this concept of "WebTone":

> Information will become a utility, rather than people having a mainframe on their desk...That's why so much of our effort this year has been directed toward what we call the WebTone—computing that's as powerful as a supercomputer, yet as reliable and as easy to use as a telephone.

Open Licensing Agreements

Sun has maintained its philosophy to offer open licensing for Java. This means that other technology companies can develop their own versions of Java, provided that it passes the "100 percent Pure Java test." Open licensing agreements have spawned more than 900,000 third-party software developers including IBM. 
and Borland. These 100 percent Pure Java programs compete directly against Sun's package, the Java Development Kit. In 1998, Sun's revenue from licensing had reached $130 million.

Internet Alliances

Sun continues to promote Java as the language of the Internet. In November 1998 the Internet community was rocked by news of a merger between AOL and Netscape. Behind the deal was a strategic alliance between Sun and AOL. Barry Schuler, president of America Online Interactive Services, explained:

There are two big phenomena that make this strategic alliance a compelling opportunity. First, consumers are coming online in droves, accelerating e-commerce. Second, businesses are embracing network computing on top of Internet standards as the architecture for all of their back-end systems. That's what this strategic alliance will do: enhance the value chain all the way from silicon to eyeballs.

Microsoft

In a world of manias and emotions, I have to make rational decisions. Someone who thinks that because a language is magic, these guys can overthrow the world — that person can't even think two chess moves ahead. You're not even in the game I'm playing.

—Bill Gates, on the possibility that Java will make Windows obsolete, 1996.

Scott McNealy's continuous belittling of Windows NT has added fuel to the competitive fire between Sun and Microsoft. Microsoft has begun an all-out assault against Java, influencing thousands of software developers to use its Windows-optimal version. Moreover, Microsoft Research has developed its own Windows-optimal virtual machine based upon technology acquired through its purchase of Colusa Software.

In 1997 Sun sued Microsoft, alleging that the company had violated Sun's license to use Java and was "polluting" the technology by distributing incompatible software tools and systems, including versions of Windows. In October 1998 Sun won the first round of the legal dispute when a federal judge issued a preliminary injunction ordering Microsoft to make its Java products compatible with Sun's Java. However, the victory was limited. The court ruled that Microsoft could still ship versions of its development tools to third-party developers and was still free to distribute Java versions developed independently from Sun's technology.

SUN'S DILEMMA

While McNealy continued to pitch Sun's audacious "WebTone" vision to Wall Street analysts, the standard that Sun had worked so hard to develop themselves seeded to be slowly slipping away:

• In November, Sun archrival Hewlett-Packard (H-P) announced the creation of the Real-Time Java Working Group (RTJWG) consortium of Internet companies to develop real-time application program interfaces (APIs). RTJWG's claim was that Sun was tardy in developing Java's real-time capabilities and that Sun's licensing fees were excessive.\footnote{Mary Jo Foley and Deborah Gage, "Vendors Wrestle to Control Java," Sm@rt Reseller, April 2, 1999, www.zdnet.com/sr/stories/news/0,4538,2236254,00.html.}

• Longtime allies IBM and Novell began to complain that Sun's licensing restrictions were too tight. IBM specifically wanted more control over how Java interacts with its own legacy system. Frustrated, Novell teamed up with Intel to develop an "optimized" version of Java.

• Microsoft enlisted the aid of Hewlett-Packard to codevelop its own version of Java. Shortly thereafter, Microsoft and H-P targeted Sun's Jini by developing a Java-based version of Microsoft's Universal Plug and Play (UPNP) software. Jini is a Java-derivative programming code that enables "dumb" devices like cell phones to communicate with a network.

With Microsoft building momentum and longtime Sun allies growing impatient, McNealy knew that Sun had to act decisively. He also knew that Sun could not win the Java war alone. There was no doubt that Java's future was uncertain and Sun was vulnerable. McNealy kept thinking of the popular film *The Godfather* and the infamous words of wisdom spoken by Don Corleone to his youngest son. "Keep your friends close, but your enemies even closer."
APPENDIX 12.1 Terminology

The "Virtual Machine"

The breakthrough application of Java was its capability of creating a "virtual machine" (VM). In essence, the VM is an abstract computer that sits between the Java program and the computer it operates on, executing Java code and guaranteeing certain behaviors regardless of the underlying hardware platform.

100% Pure Java

100% Pure Java is Sun's Java language without the embellishment of other companies' designs. The 100% Pure Java initiative was formed as a reaction to competitors like Microsoft who make versions of Java that ran better in certain environments and on certain platforms. 100% Pure Java stands for Sun's commitment to a platformless Java that treats all systems equally.

Jini

Jini is a Java-based language that allows computers and devices to quickly form impromptu systems unified by a network. The system is a federation of devices, including computers, which are simply connected. Within a federation, devices are instantly on—no one needs to install them. Similarly, you simply disconnect devices when you don't need them.

Solaris

Solaris is a 32-bit and 64-bit UNIX operating environment for enterprisewide computing. For users who value distributed network computing, Common Desktop Environment (CDE) for Solaris offers a high-performance, industry-standard desktop environment.

SPARC Technology/SPARC Families

SPARC is the flagship processor family for Sun. SPARC is characterized by design simplicity, allowing shorter development cycles, smaller die sizes, and ever-increasing performance. The SPARC architecture enables a unique combination of semiconductor and design scalability. With its multiprocessor capabilities, high bandwidth support, and register window design, the SPARC design allows implementation through a range of price/performance levels. SPARC processors achieve a higher number of instructions per second with fewer transistors.

Source: [www.sun.com](http://www.sun.com)
APPENDIX 12.2            Sun Product Portfolio

Management Solutions
• System Management
• Intranet Management

Support Solutions
• Educational Services
• Professional Services
• Online Support Tools

Development Solutions
Workshop Development Products
• Java WorkShop
• Sun Visual Workshop for C++
• Project Studio

Java Products
• Java Developer's Kit (JDK)

Deployment Solutions
Desktop Computers
• JavaStation Network Computer
• Ultra Family of Workstations
• Creator and Creator3D Graphics Stations
• Sun Elite3D High-end Graphics Station

Servers
• Sun Enterprise family of servers
• Sun Enterprise Starfire data center
• Netra family of dedicated file servers

Storage
• Sun StorEdge family of mainframe class and desktop storage products
• Components and Boards
• UltraSparc
• picoJava

Source: www.sun.com
APPENDIX 12.3 Strategic Alliances and Licensing Agreements

Computers/Information Services
• IBM

Consumer Electronics
• Sony
• Samsung

Digital and Wireless Communications
• Alcatel
• Nortel
• Motorola
• Ericsson
• Siemens-Nixdorf

Electronic Commerce/Internet
• AOL/Netscape

Enterprise Resource Planning
• Baan
• Oracle
• PeopleSoft
• SAP

Interactive Television
• OpenTV
• Scientific Atlanta

Java Development Tools
• IBM
• Symantec/H-P
• Borland
• BEA Systems

Network Software
• Novell

Source: www.sun.com