WILL JAVA BREAK WINDOWS ?

Java has the power to break the Microsoft lockin of applications profits and lockout of rival operating systems.

The croak on the end of the line came from a fitness center. Huffing and puffing away on his cellular phone and exercycle was Jim Rogers, famous Alabama hick centi-millionaire motor biker, Columbia professor of finance and dreadnought plunger into the world's most porcupinous stockmarkets and briarpatch bourses. From Botswana to Sri Lanka, Rogers waits till there is blood in the streets, the IMF has thrown in the towel even on high taxes and devaluations as its enematic remedy, and there are hostages and hysteria at the Hilton. Then if from some smoke filled bunker the government issues an order for the privatization of hemp–it's a buy signal!–he invests.

"Hey, all that stuff in your letter is great George," he gasped. "But what I want to know is when I short **Microsoft** (MSFT)."

"I'd like to do it now," he added, "but I don't want to get in the path of a freight train."
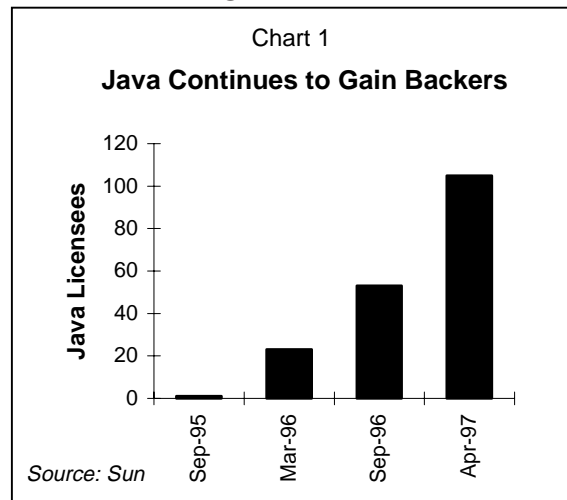
This is no market timing letter and I leave the short sales to swashbucklers like Rogers. But at 40 times forward earnings and 15 times revenues–and a market cap of 159 billion, implying continued growth at a rate of 23 percent per year and revenues of $500 billion in 20 years–Microsoft seems to be one of the more succulent sells in the history of the market. I would say, "Go for it, Jim." But Bill Gates is smart. He may well soon stop fighting the spread of **Sun**'s (SUNW) Java programming platform.

However, if he is spoofing Java–and most of the evidence suggests only "bait and enrich" platform neutrality–Jim, go for the short. It should be clear in the next six months.

It is a year and one half since Pearl Harbor day 1995, when Gates finally got on board the only freight train that counts these days, the Internet with Java. Fueled by the efforts of some

Chart 1

Java Continues to Gain Backers

Source: Sun

400 thousand developers, who continue to report as much as fivefold increases in their productivity, Java has the power to break the Microsoft lockin of applications profits and lockout of rival operating systems. As a cross platform solution, Java flattens the playing field for Microsoft's competitors. But even early this year, Gates still did not really get it. He was still largely in denial, grousing about Internet "hype," and delusionary "holy grails" in computer languages and cackling about the silliness of his critics. For all his heralded transformation of the company in late 1995 ("Capitulation" blared out the *Computerworld* headline), Gates was a computer man in rebellion against the Internet paradigm.

Explains Einar Stefferud of **Network Management Associates**, computer people focus on the desktop or the LAN (Local Area

Network) where there is only one owner present and in control and problems can be solved by changing everyone else's software. Beyond a particular LAN, though, everything gets more complicated. It is a new paradigm. As Microsoft will tell you, it is hard enough even to link together the various separate LANs on the Microsoft campus, each with a different administrator and different priorities. Beyond the pale is the Internet, a network of networks, where anybody can change the configuration of their machine at will and where nothing works if it is based on trusting the guy on the other end.

The Internet requires you to step out of the Office97 into a heterogeneous jungle, where by the end of the year there will be some 20 million computers that have upgraded to non-Microsoft operating systems since January 1996. But after dinner, when the arguments heat up, Microsoft's top people will tell you they essentially want a standard that they own and control–a solution for the 90 percent of the desktops that use Microsoft operating systems, a way to extend the Office onto the web. They are frankly baffled by the widespread demand for cross platform solutions and ascribe them to predatory schemes by their rivals. Why not make the Internet into a LAN? Aren't the holdouts with unpopular operating systems merely bad losers. In time they will go away.

From this point of view, Java is merely a distraction, an inferior, slow, and ultimately ineffectual solution to the interoperability problem. After all, the **Intel** (INTC) x86 instruction set is the most common byte code in the industry. If you want portability, why not just write to that? Many companies have created emulators that can simulate other systems on the x86 or translate the x86 instructions to other processors. Outside companies such as **Insignia Solutions** (INSGY) will give you emulators that can run 95 on a Mac. **Visix** will give you its Galaxy APIs that allow interoperability with Mac, Unix, and whatever you want. These methods are slow, just like Java, but they get the job done. In March 1996, Microsoft bought a small firm called Colusa that supplies processor independent byte codes "better than Java." Colusa allows platform independence and security without sacrificing go-tos and pointers to specific memory addresses (as Java does for security and reliability reasons). According to the press release, Colusa will be included "in future versions of Internet Explorer." And nobody stops to say, "Huh?"

By contrast, Internet people know that cross platform robustness is not a business tactic; it is

the very heart of the Internet paradigm. Ninety percent won't do. Ninety nine and one half won't do. There are some hundreds of thousands of owners–perhaps a hundred and fifty thousand separate networks making millions of separate choices–and no possibility of imposing a panacea. As Stefferud puts it, in a distributed heterogeneous world, with "distributed change control," you cannot change the core without long deliberation and much public debate. You must keep the core simple and public to accommodate a necessarily chaotic and creative periphery. Java requires absolutely no change in the core, no change in the operating system, no change in transport protocols. It is a platform created for the new world of the net. You don't have to trust anyone to use it. As Stefferud says, security must be achieved at the end points. The security is not on the net or on the operating system or in an encrypted signature as on ActiveX controls, but in the Java engine itself that executes the program.

Java does not optimize for the desktop at all. It does not adapt to the instruction set of the microprocessor. It is not designed for microprocessor speed. It is designed for programmer speed. It asserts that the net paradigm eclipses the desktop paradigm. Just as Bill Gates and his PC eclipsed the mainframe paradigm and relegated to irrelevance thousands of wonderful mainframe optimizations, James Gosling and Java have eclipsed the desktop paradigm and rendered many of its most elegant solutions obsolescent. In the world of Java, there is no benefit to operating system homogeneity. For every application or environment the best OS can prevail, even if much of the time it is not NT.

As a network system, Java does not care how it is transported. It can be invoked by an HTTP command on the World Wide Web. It can be tagged and bagged in an Internet MIME (Multipurpose Internet Mail Extensions) envelope. It is safe, secure, platform independent; it's "interpreted," which means it does not have to be translated by a batch "compiler" for a specific machine; it plays on any machine, from a video to a vibrator. It collects your garbage (its automatic garbage collection is a way of managing memory, cleaning out the stables, during the writing and running of code). It prevents programmer errors. It's multithreaded so no one cares if it is slow. It opens doors and shatters Windows. It builds market cap as by magic. It raises the sun and illumines the road ahead to a new computer architecture. Give poor Bill a break.

In this world of manias and emotions, "I

have to make rational decisions," Gates said then, glaring at me. "Somebody who thinks that because of a language that 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."

That was less than two years ago. Today all has changed. On web pages, Java applets outnumber ActiveX controls by a factor of seven. Java programmers are showing as much as five times the productivity of C++ programmers. By the end of 1996, Gates had assigned some 300 Microsoft programmers to plant a hedge of Java products. In May 1997, he purchased Dimension X, holder of an early Java license and commanding 40 top Java programmers from Sun and elsewhere. Rob Muglia, Microsoft VP for development, confirmed a central Sun claim: "Java makes programmers far more productive."

Yet, at the highest levels of Microsoft, the endorsement of Java, even as merely a programming language, is anything but wholehearted. Toward the end of November in 1996–a year after my meeting with Gates–I traveled to Seattle to the home of Charles Simonyi of Microsoft. A Hungarian immigrant genius who made his way to the US in the 1950s, he starred at **Xerox** PARC (XRX) in its most creative period and ended up at Microsoft to found its applications division, beginning with Excel and Word. Just a few hundred yards from Bill Gates' famous dwelling, Simonyi's alabaster palace gleams next to the home of Nathan Myhrvold, the physicist-programmer who is known as Gates' closest intellectual associate.

Since Microsoft had adopted Java and launched leading edge Java tools, I expected Simonyi and Myhrvold at least to pretend to celebrate the possibility of a more rapid advance in software, spearheaded by Microsoft as a Java paradigm company. But at the mention of Java, Myhrvold leaned forward with a growl. Speaking rapidly through his beard in a nasal voice resembling Gates', he launched into a passionate reprise of his boss's line of the previous year. Didn't I know of Lisp, Smalltalk, ADA and all the other "revolutionary" languages which claimed to enhance programmer productivity? Java is the same, he said.

"It's the Monkees," said Simonyi, referring to the singing group that briefly posed as American Beatles. "They had a few hits and then disappeared. Java will be the same. It will be totally forgotten. Microsoft is the Beatles."

As for platform independence, he asked, "It's only significant to the vendors of platforms with a tiny marketshare, under one percent. Why does anyone else care?"

Myhrvold declared that measured by lines of code software had advanced just as fast as hardware and had taken advantage of every hardware gain. Java's claim of automatic memory management– "so called garbage collection" –is empty, he asserted. Microsoft has explored the issue at length over the years. Memory management might work in an applet, but it will not scale to a large program. It will break down. Claims of large gains in programmer output are "pure baloney," he said.

Simonyi chimed in to deny Java's claims to have solved the problems of component software– systems that could be put together like lego blocks. "These problems have not even been solved at Microsoft, in one company. How could anyone solve it across the net." And Java had not even begun to create true portability and it never would, he added.

Chart 2
Java Dwarfs ActiveX

Thousands of Web Pages

300
250
200
150
100
50

Java   ActiveX

Source: HotBot Searches

After the reams of doubletalk publicity from Microsoft, supporting Java, it was challenging and refreshing to hear these direct and emphatic declarations from the company's two leading intellectuals. They were making clear, falsifiable bets. Java does not much improve the efficiency of programmers. Java garbage collection will not scale. Component software over the net will not work. Java will dwindle away in time. Network computers will fail. Cross platform portability is a pipe dream. As a business man, Gates would hedge the issue by defensive investments. But at the heart of Microsoft erupted a hymn of pure hostility to the new paradigm in computing and software.

A software paradigm is like a language in more than name. Having mastered one idiom, it is devilishly hard to relinquish it for another in which you are not fluent. Over the last five years, the software world has adopted a model called objects that requires an entirely new thinking process on the part of programmers.

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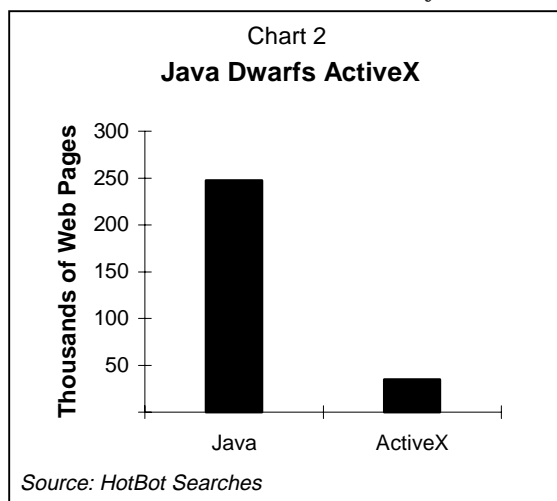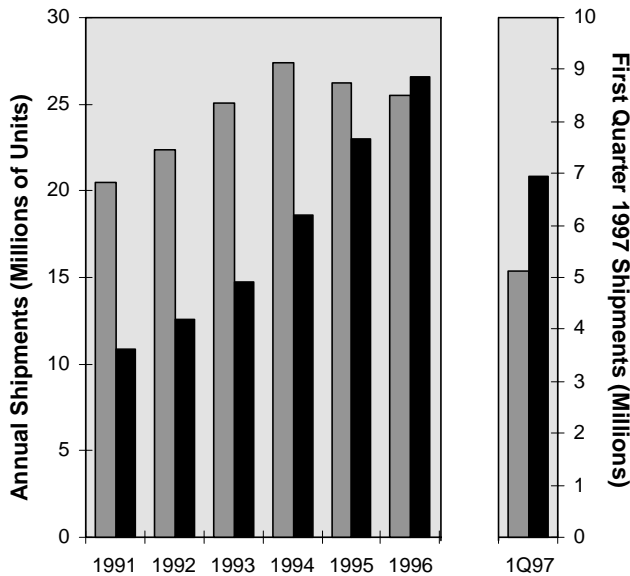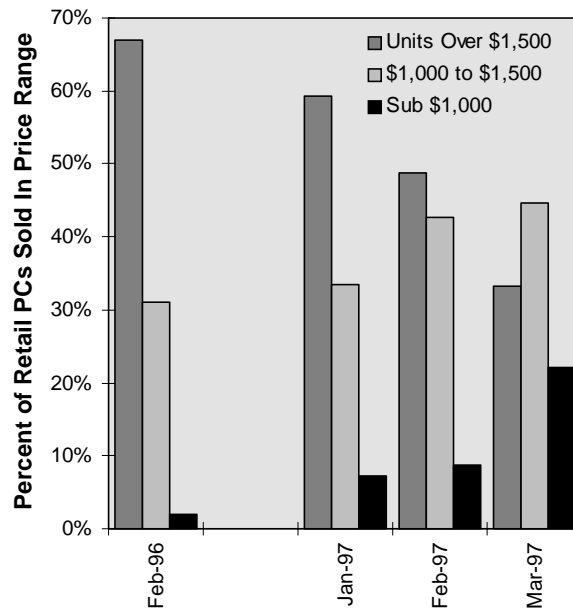
PCs CONTINUE ADVANCE

Chart 3
US PCs Soar Ahead of TVs

Annual Shipments (Millions of Units) — left axis; First Quarter 1997 Shipments (Millions) — right axis

Years: 1991, 1992, 1993, 1994, 1995, 1996, 1Q97

Sources: Dataquest, IDC, CEMA

Chart 4
Sub $1,000 PCs Accelerate Gains

Percent of Retail PCs Sold In Price Range

Legend:
- Units Over $1,500
- $1,000 to $1,500
- Sub $1,000

Periods: Feb-96, Jan-97, Feb-97, Mar-97

Source: Computer Intelligence

US PC sales outstripped TV sales by 36% in 1Q97 *(Chart 3)*. Though business purchases account for much of the PC lead, since early March weekly CEMA/Verity Group surveys show that, on average, consumers who are "very likely to buy" a PC in the next 6 months outnumber those with TV purchase plans by 20%. Much of the excitement on the consumer level has come from the increasing success of sub-$1,000 computers. Sub-$1,000 PCs captured 22.1% of March retail sales, 2.5 times February market share *(Chart 4)*. Average retail selling price dropped to $1,400. As early as March 13, a *Computer Retail Week/Verity Group* survey showed that some 33% of respondents from non-PC households had already learned of full-featured PCs for under $1,000, and 12% of non-PC owners were more likely to buy a computer because of the lower prices–enough to bring PC household penetration from 40% + to near 50%. Now, only two months later, Packard Bell, Compaq, AST, Acer, and Monorail are aiming for $799, and lower. Utilizing fast Cyrix and AMD Pentium class processors, the success of these systems is validating and opening the market for non-"Intel inside" computers. As Centaur Technology and National Semiconductor join the chip competition, Intel may find that its narrow focus on ever faster processors overlooks the basic needs of average PC users.
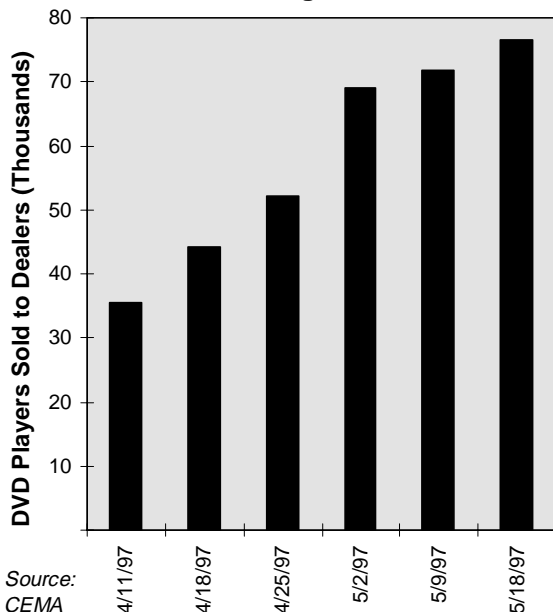
Gateway 2000 hits the $1,000 price point for a business PC with its new E-1000, a 166Mhz PC with integrated 10/100 Ethernet. As Gateway replaces Apple among the top five US PC venders, attention has focused less on Apple's demise than on the success of Gateway's direct marketing which has generated 1Q96-1Q97 unit shipment growth of 34.5% *(Dataquest)*. Fellow direct seller Dell reports 58% revenue increases, units shipments up 61.8% worldwide, an industry-leading inventory position of only 12 days (equivalent to 30 inventory turns/year), 21.6% gross margins, and website sales of over $1 million/day. The impressive gains of these direct/mail-order PC vendors has generated increasing talk of retail build-to-order (BTO) programs. BTO attempts to realize the benefits–cut inventories, increased turns, eliminated returns, higher margins–enjoyed by direct sellers while providing consumers with an in-store environment for hands-on gratification. Compaq, having been rebuffed in its attempts to buy Micron and Gateway, is trying to stay ahead of Dell with a reseller BTO program for corporate sales. Computer City and CompUSA are implementing BTO, while Staples, Circuit City, Montgomery Ward and OfficeMax are considering it.

Just as digital audio compact disks (CDs) came to replace analog records, a measure of the demise of analog TV will be the adoption of DVDs (Digital Versatile Disks). Capable of storing up to 17 gigabytes of digital data, the two sided CDs will eventually replace both CD-ROMs and audio CDs, with the added capability of playback of high quality MPEG-2 video. Sales of DVD-V (Video) players and movies began in March *(Chart 5)*. DVD-ROM drives are coming soon in Toshiba, IBM, Compaq and other PCs, to be followed by recordable DVD-RAM in the near future. Audio CDs are a likely indicator of the trend for DVDs. First popularized in specialized audio CD players, audio CDs are listened to more and more on PCs as PCs have became more capable and ubiquitous in everyday life *(Chart 6)*. DVD video will follow the same path from stand-alone players to PC-centric entertainment/computing centers.
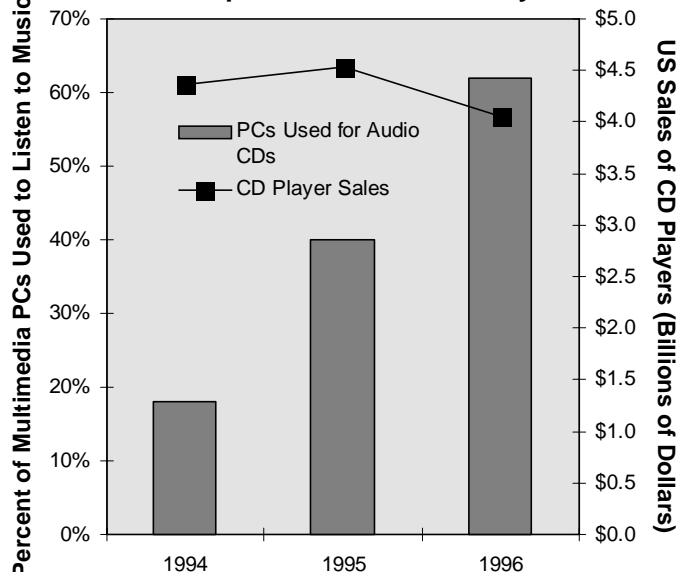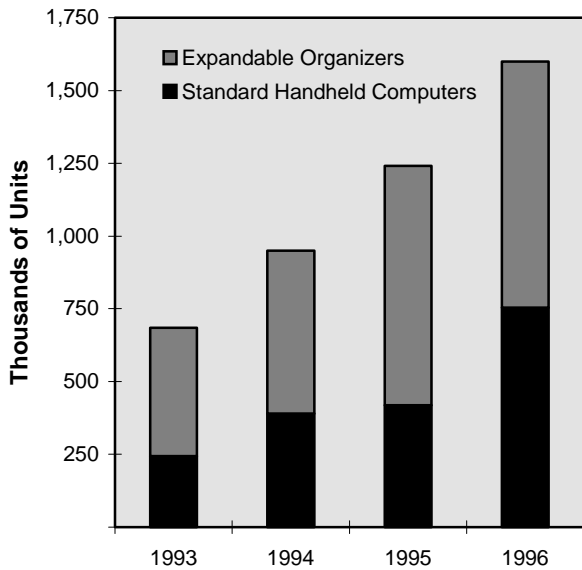
–KE

Chart 5
DVD Begins to Roll

DVD Players Sold to Dealers (Thousands)

Dates: 4/11/97, 4/18/97, 4/25/97, 5/2/97, 5/9/97, 5/18/97

Source: CEMA

Chart 6
PCs Expand Role As Audio Player

Percent of Multimedia PCs Used to Listen to Music — left axis; US Sales of CD Players (Billions of Dollars) — right axis

Legend:
- PCs Used for Audio CDs
- CD Player Sales

Years: 1994, 1995, 1996

Source: CEMA

Chart 7
Handheld Computer Shipments

Thousands of Units

- Expandable Organizers
- Standard Handheld Computers

1993 1994 1995 1996

Sources: Dataquest and GTG

Chart 8
Korean CDMA Sales Accelerate

Handphone Sales (Thousands of Units)

- Digital Handphones (CDMA)
- Analog Handphones
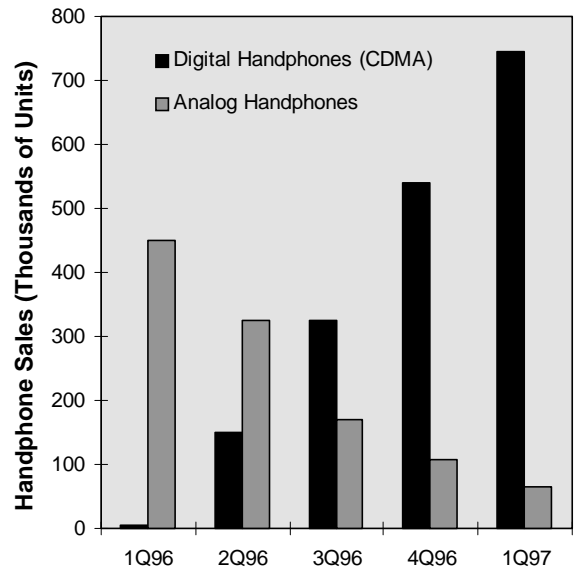
1Q96 2Q96 3Q96 4Q96 1Q97

Source: Samsung Electronics Co. Ltd.

The handheld computer *market's growth in 1996 can largely be attributed to US Robotics' successful introduction of the PalmPilot PDA (personal digital assistant) with sales of some 385,000 units. In the US retail market, according to PC Data, the Pilot's 70% share compares to 20% for Windows CE HPCs (handheld PCs) and a dwindling 9.5% for the Psion, HP products, and the Newton–being spun off into an Apple subsidiary. Dataquest divides the handheld computer market into the expandable organizer and standard handheld computer classes, and estimates that the Pilot accounted for all of the growth and a 51% share of worldwide sales in the standard category (Chart 7). The broader smart handheld market totaled 3.1 million units in 1996, according to IDC, including 2 million handheld companions, some 1 million vertical application devices and the emerging category of smart phones such as the Nokia 9000.*

CDMA handphone sales *continue to accelerate. Following QPE's (Qualcomm Personal Electronics) February 1997, announcement of 1 million phones sold, QPE has continued production at or near their capacity of 300,000 phones per month, bringing their current total to nearly 2 million units. In Korea, Samsung announced their 1 millionth CDMA handphone sale in April, and plan to increase production from 200,000 to 400,000 phones/month. CDMA handphone sales have completely dominated the Korean market (Chat 8), with sales increasing to 300,000 in April for a cumulative total of over 2 million phones. Accounting for the balance of QPE and Samsung shipments, US and Hong Kong sales would now number some 1 million units.*

Website profitability has kept pace with the growth of the Internet. *According to the findings of ActivMedia, despite a 7 fold increase in the number of commercial websites in the last year, the percentage reporting profitable operation remains unchanged at 30%; 60% generate sales revenues (up from 34%); 17% attract advertising revenue (up from 6%); average revenues have doubled among sites with revenue; and 10% produce $10,000 or more monthly income accounting for 90% of all Web revenues. ActivMedia has also documented a significant change in the nature of the Internet from a virtual source of information, dominated by publishing and service industries, into a market place for material goods, with increasing participation from retailers, distributors and manufacturers (Chart 9). As the Internet has diversified, it has also become more relevant to users. Find/SVP reports that over 20 million Americans have come to view the Internet "indispensable." The World Wide Web and email are now used by 49% and 59% (respectively) of Internet users on a daily basis, nearly all (88% and 89%) on a weekly basis. With these developments, Internet traffic through the NAPs (National Access Points) and MAEs (Metropolitan Area Exchanges) continues to show dramatic growth–despite the increasing percentage of unmeasurable traffic (Chart 10).*
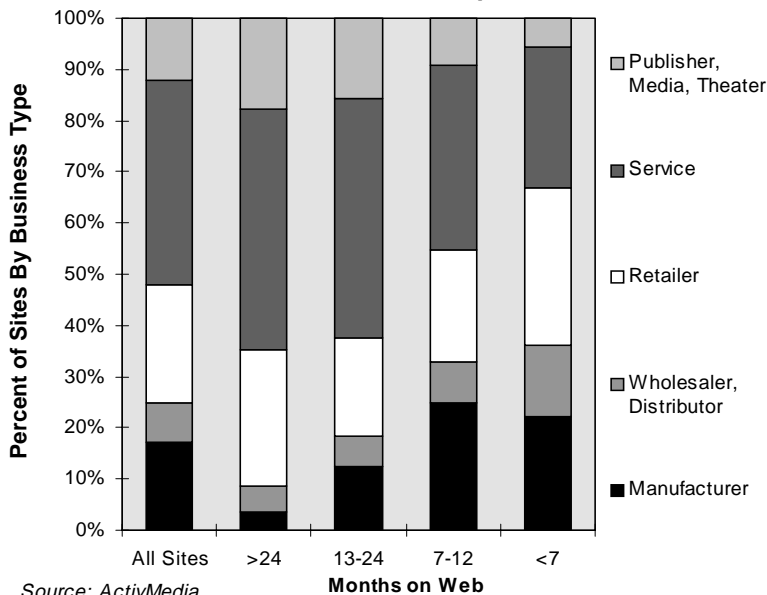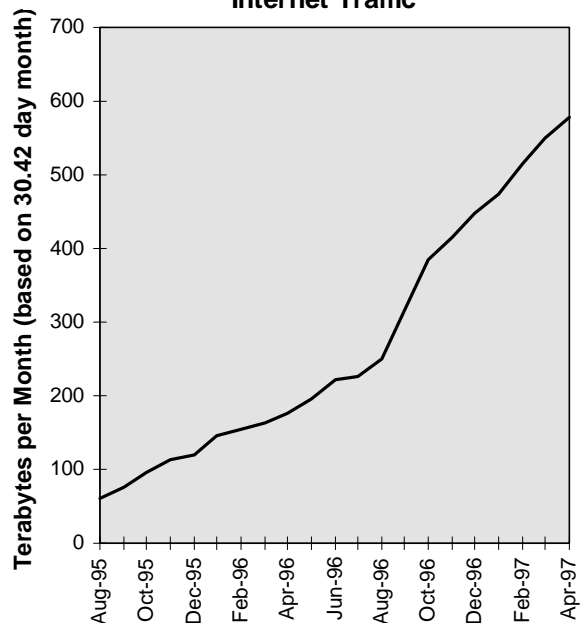
–KE

Chart 9
Commercial Web Site Composition

Percent of Sites By Business Type

- Publisher, Media, Theater
- Service
- Retailer
- Wholesaler, Distributor
- Manufacturer

All Sites   >24   13-24   7-12   <7

Months on Web

Source: ActivMedia

Chart 10
Internet Traffic

Terabytes per Month (based on 30.42 day month)

Aug-95 Oct-95 Dec-95 Feb-96 Apr-96 Jun-96 Aug-96 Oct-96 Dec-96 Feb-97 Apr-97

IBM has over 2,500 Java developers, more than any other company, and recently began a 24 hour program to produce Java programs faster.

Java is the latest and most pure expression of the object-oriented paradigm. Rather than treating data and processing as two separate streams that join only in execution, object-oriented systems join the two in protective containers with interfaces observing specific rules that conceal the details of processing from the user's program. Thus changes in the object–whether an invoice or a graphic–do not require changes in the program that uses it. Objects become components that can be invoked by a variety of programs.

Mandating general usage of the partly object-oriented C++ programming language, Microsoft has laboriously adopted this model in a hybrid form. It developed a desktop oriented software paradigm based on its technology of object linking and embedding (OLE) that allows compound documents such as Word text files incorporating Excel spreadsheets. It generalized OLE into a system for any software package to invoke services from any other and called it COM (Component Object Model). This was a large step toward object orientation but it still ignored the net.

A World Wide Web page, however, can be treated as a compound document with hyperlinks that invoke other objects. In 1994, Microsoft extended COM to connections between different computers as Distributed COM, and elaborated on it a set of applet-like functions called ActiveX for the web. Microsoft's Explorer 3.0 browser is essentially a compound document container that can invoke ActiveX controls to display pages and invoke software functions.

Explains Mark Ryland, Microsoft leader of OLE and ActiveX teams, "We are taking COM and ActiveX and giving them security and protection. Sun is taking Java and giving it a native interface for applications. We are enhancing security on ActiveX and they are jacking up the performance of Java. What's the difference except that 90 percent of computers already run on operating systems using COM?"

That's the view in the Microsoft world. But it is not the real world anymore. I just returned from the **IBM** Technical Interchange Conference in Saint Louis where a very different picture was emerging. Bill Gates meet Katrina Garnett and her team from **Crossroads Software** which was helping to introduce a new IBM Java Beans development tool.

Fueled with investments of some $15.8 million from such backers as **SAP AG**, **Venrock Associates**, Michael Dell of **Dell Computers** (DELL), Crossroads was founded a year ago November by a group of **Sybase** (SYBS)

engineers led by Garnett. It provides ways to interconnect diverse enterprise software programs. Examples include SAP's financial, manufacturing, and human resources tools, **Vantive**'s (VNTV) customer interaction packages, **Clarify**'s (CLFY) customer tech support, **Baan**'s (BAANF) resource management software and **Powersoft**'s database development tools, now embracing Java. These firms are all growing at a rate near 50 percent a year and their equipment coexists in an increasing range of companies, performing related functions in parallel. But these programs mostly cannot respond in real time to cross program and cross platform event–such as orders and invoices– that involve customers, manufacturing plans, financial accounts, and employees.

Coming from Sybase, all the Crossroads programmers planned to use C or C++. But when it came time to do the programs–major projects requiring several hundred thousand lines of code to be produced in six months–the group decided to experiment with Java. Navid Kahanagi, VP of Engineering and Prashant Gupta, Chief Technical Officer, were genuinely shocked to find that Java increased the coding productivity of their programmers by a factor of ten. Gupta was sold the first day when after spending two hours learning Java syntax from an assistant, the assistant had to leave for an emergency at 3 pm. Gupta decided to try a little programming on his own. By nine o'clock that night, he had written eight hundred lines of code that he expected to take two weeks in C++.

From then on they did almost everything in Java. Kahanagi lists six key benefits. First was productivity–the 10 fold gain, largely from garbage collection, memory management, and the pure object discipline imposed on programmers. Second was cross platform portability. They did the first iteration on NT but they are porting it simply to Unix and the web in the second release. Third was testability. Because of the object-oriented discipline imposed by Java, the components are easier to isolate and test. Fourth was the simple model of multithreaded synchronization which was vital for the interactive applications. Fifth was the robustness and security. These business critical Crossroads systems can not be allowed to crash. Sixth was upgradeability on the fly. Java as an interpreted language can be upgraded with new capabilities–new "classes"–on the fly. This allows the 24 by 7 availability that is necessary for these key company systems. C++ can be revised in real time only through the cumbersome replacement of DLLs (dynamic link libraries).

Confirming the experience of Crossroads is IBM. Throughout the history of the company, IBM has seethed with multiple systems. From system 360 to SAA (system application architecture), the company has tried and failed repeatedly to overcome these splits. Release the Windows version first or the version for OS2 or AIX? With these tensions overcome, IBM has quietly become one of the most enthusiastic and helpful supporters of Java, working with Sun on large parts of the language from IBM's Java Technology Center in Hursley, UK and around the globe. IBM has over 2,500 Java developers, more than any other company, and recently began a 24 hour program with code being passed around the globe to follow the working day, to produce Java programs faster. Java's modularity makes this scheme an easy winner. OS/2 was the first OS to integrate Java in a shipping version. With an increased software base and a graphical and uniform front end, IBM's hardware products will become easier to sell.

Among other potential winners from Java are **Digital Equipment** (DEC), owner of Alpha, the world's fastest microprocessor and StrongARM the world's fastest low power processor for Java code. **Oracle** (ORCL) originally adopted StrongARM in the reference platform for the new NC computer, though Oracle has recently spoken of adopting a low power Pentium. With the best user interfaces and most loyal customer base, **Apple** (AAPL) should also benefit. Though the company has been agonizingly slow in embracing the new language–Newton for example remains Javafree–Apple has announced that Java is going to be a central plank of Rhapsody, their OS based on the NeXT system. With Java, Apple can launch Rhapsody with a large applications base already in hand.

At **Netscape** (NSCP), Marc Andreessen has recently stated an eventual intention to convert its browser entirely to Java. With more and more porting problems (it currently supports 19 platforms) in some five "languages" –C, C++, HTML, JavaScript and Java–Java could save the company.

Netscape commands one key Java related advantage over Microsoft. A start-up called **Marimba** led by Kim Polese and Arthur Von

Hoff of Sun's Java team has licensed their Castanet push technology to Netscape for its new Netcaster product. With Castanet in every browser, Netscape can upgrade the user's copy of Communicator at any time, and so can increase the user's feature set dynamically, and quickly fix bugs and security holes.

A less famous company that could revive its fortunes with a Java uplift is **Applix** (APLX), of Westboro, MA. A meteoric stock that climbed to $41.25 in March of 1996 and plunged to $3.25 in April of this year, Applix commands a server based office suite that interfaces to database engines. Called Applix*ware* it suggests a Unix version of the Windows based **Citrix** (CTXS). Recently adopted by Microsoft, the Citrix technology permits remote access to Windows programs over the net through front ends written for PCs. The PCs issue a stream of keystroke and mouse codes and receive from an NT server a stream of distilled Graphical Device Interface (GDI) signals, all platform specific.

Previously a Unix office software supplier with leading banks and investment houses as customers and some $40 million in revenues, Applix has turned to Java to escape from the Unix ghetto. Investing some $2 million in R&D, it has incurred losses in the process. But with government and financial sector companies lining up for the new Java product, profits should soon begin flowing. Adding a Java front end and other interactive Java features, Applix*ware* is reemerging as Any*ware* in a user customizable and platform independent form.

Unlike **Corel** (COSFF), which is creating an all Java office suite that runs on the client (GTR, Oct. 1996), Applix products run the calculation engines on the server and only the user interface on a Java client. Levering the portability of Java's graphical user interface AWT (Application Windowing Toolkit), Applix has created an applet which can act as the front end for Applix applications on any device with a Java virtual machine. Unlike Citrix, which will be an additional plugin on the Internet Explorer and entails constant screen updates from the NT server over the lines, Applix*ware* uses the Java Virtual Machine both to achieve platform independence and relieve the burdens on Internet bandwidth. The Applix suite works

Applix has created a Java applet which can act as the front end for Applix applications on any device with a Java virtual machine.

Chart 11

Java Books

Number of Titles

Source: WWWiz Magazine
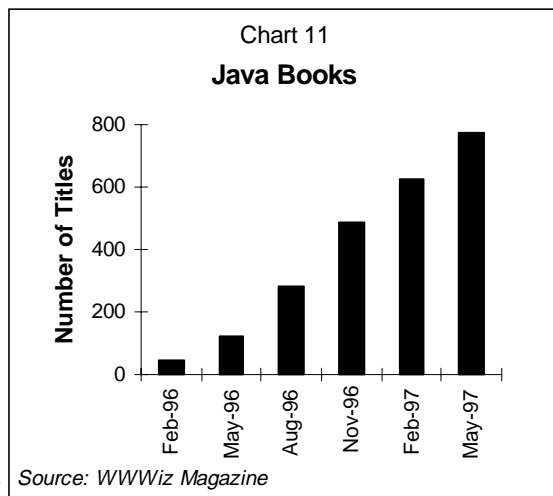
ASCENDANT TECHNOLOGY	REPORT(S) Volume: No.	COMPANY (SYMBOL)	Initial Reference Price	Price as of 05/23/97
Erbium Doped Fiber Amplifiers, Telecommunications Infrastructure, Wave Division Multiplexing (WDM)	II: 2, 3, 4	Alcatel (ALA)	16 3/4	24 5/8
Analog to Digital Converters (ADC), Digital Signal Processors (DSP), Silicon Germanium	II: 3	Analog Devices (ADI)	22 3/8	26 1/4
Java Thin Client Office Suite, Rapid Application Development (RAD)	II: 6	Applix (APLX) +	4 1/2	4 1/2
Digital Video Codecs	II: 5	C-Cube (CUBE)	23	18
Erbium Doped Fiber Amplifiers, Wave Division Multiplexing (WDM)	II: 2	Ciena (CIEN)	23 *	46
Low Earth Orbit Satellites (LEOS)	I: 2 II: 1, 3, 4	Globalstar (GSTRF)	43 1/2	53 3/8
Telecommunications Equipment, Wave Division Multiplexing (WDM)	II: 1, 2	Lucent Technologies (LU)	47 1/8	64
Internet Software	I: 1, 3, 4 II: 1, 4, 6	Netscape Communications (NSCP)	53	30 1/2
Code Division Multiple Access (CDMA)	I: 1, 2 II: 1, 3, 4	Qualcomm (QCOM)	38 3/4	56 1/4
Java Programming Language, Internet Servers	I: 1, 2, 3, 4 II: 1, 5, 6	Sun Microsystems (SUNW)	27 1/2	33 7/8
Servernet System Area Networks (SAN)	I: 1	Tandem Computers (TDM)	9 1/2	14 3/4
Optical Equipment, Smart Radios, Telecommunications Infrastructures	I: 1 II: 1, 2, 3	Tellabs (TLAB)	29 1/8	49
Digital Signal Processors (DSP), DRAM	I: 2, 3, 4 II: 5	Texas Instruments (TXN)	47 1/2	93 1/8
Gallium Arsenide Integrated Circuits (IC)	I: 2 II: 3	Vitesse (VTSS)	21 5/8	35
Code Division Multiple Access (CDMA) Testing Gear	II: 1, 2	Wireless Telecom Group (WTT)	10 3/8	10 5/16
Field Programmable Logic Chip	I: 3	Xilinx (XLNX)	32 7/8	53

+ New Addition   * Initial Public Offering

Note: This table lists technologies in the Gilder Paradigm, and representative companies that possess the ascendant technologies. But by no means are the technologies exclusive to these companies. In keeping with our objective of providing a technology strategy report, companies appear on this list only for these core competencies, without any judgement of market price or timing.

on Unix and NT servers and affords access to legacy files through more than 50 export and import formats. At a hefty $295 per seat and $4,995 per server (still negotiable prices from the world of Unix), Applix sells this technology as an office suite. It also offers a more expensive package which allows a company to write its own programs using the Applix Java front end. As Applix moves its products down market, the company can become an important vessel of the Java paradigm.

The fight between Java and Microsoft is a clash of paradigms. Java began with the Internet paradigm and has flourished with the spread of the multiplatform web. ActiveX began on the desktop and is withering on the net. The winners will observe Stefferud's model, relegating complexity to the edges, preserving openness and simplicity in the core, and relying on bandwidth to improve it. If Microsoft cannot accept the industry's commitment to achieve openness through Java, it will be time for Jim Rogers to issue a momentous

short. If Microsoft does devote its huge resources to fulfilling the Java promise, however, the company could well achieve its $500 billion destiny. The margins will be lower but the profits will be greater in a global economy based on the Internet as its new central nervous system.

George Gilder, May 25, 1997

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