

IBM Confidential



# Java Strategy Update

May 19, 1997

## Overview:

Java continues to gain momentum faster than anyone expected. Java is a significant threat to Microsoft's dominant position in the industry. Microsoft's initial attempt to get control of Java has failed. However, Java's success is by no means assured. Microsoft recognizes the severity of the threat and will use all available means to eliminate or control it. The success of 100% Pure Java depends upon ISVs and customers selecting it as the platform on which they build their business applications. This process is just beginning, it is too soon to tell if 100% Pure Java or Microsoft will emerge as the victor.

IBM has been one of the most visible supporters of Java in the industry. We have contributed a significant amount of IBM technology to JavaSoft. We have also played a pivotal role in keeping the Java coalition together. We have Java-enabled our product line. Technically, we are well-positioned to benefit from Java's success. To reap the benefits, we must quickly generate significant market momentum to drive sales of our products and services.

## Objectives:

This paper is an assessment of the status of IBM's Java strategy. It addresses the following questions:

- Is Java on target to become the industry standard platform for building network centric business applications?
- What have we been doing to help drive the Java standard, and what additional things do we need to do to increase the probability of its success?
- What do we need to do to position ourselves to profit from Java?

## Is Java going to emerge as the platform for building network centric applications?

By any measure, the adoption of Java is moving faster than any previous platform. It has been just 2 years since the first pre-alpha version of Java was distributed on the Web. Two years later, Java is changing the computing landscape:

- There are now 400,000 serious Java developers up from 200,000 six months ago - it is estimated that there will be 600,000 by the end of 1997.<sup>1</sup> There are twice as many Java programmers today than there were C programmers ten years after C first shipped.
- Over 160 Universities are offering courses in Java.
- There are over 200 Java books in print - which surpasses the number of books available on C++.
- Of the 1 billion smartcards manufactured each year, 70% are manufactured by Gem Plus and Schlumberger - both are planning on using Java as the operating system for their smartcards.
- A recent survey showed that 80% of the companies surveyed are considering using Java while only 43% are considering ActiveX.<sup>2</sup>

Java has won the first battle but the war is not over. Java will be one of the principal languages used to build network centric applications. Microsoft is trying to surround Java with proprietary Windows interfaces, which will give developers the benefits of the Java language but the applications will only run on Windows. The Java coalition, which includes Sun, IBM, Oracle and Netscape, is promoting 100% Pure Java, which will run on all popular platforms. The winner will be determined by which option customers and commercial application developers invest in.

In the remainder of this paper we will use Java to refer to 100% Pure Java and ActiveX to refer to Microsoft's Java implementation.

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<sup>1</sup>Java Computing Days, May 1997 and IDC estimates

<sup>2</sup>Softbank, 3/97.

## Will customers standardize on Java?

Fifty-two percent of Fortune 1000 firms have put some corporate resources into prototyping and/or developing applications in Java. Sixteen percent of them have already rolled out their first Java application. Other surveys have shown that there is significantly less Java activity in small and medium enterprises - most of them will buy Java applications rather than developing them in-house. Most of the initial Java applications are simple applets that enhance the usability and visual appeal of a Web site. Customers believe that Java has the *potential* to have a much bigger impact on their business - forty-two percent plan to use Java in mission critical applications by 1999.<sup>3</sup> The benefits that customers expect are:

- **Extend their reach** - Leading edge companies are starting to integrate their businesses with the Web by extending their external business processes, marketing, sales, customer service, stockholder relations, employee recruitment and even distribution, if their content is electronic (i.e. software, financial transactions, etc.), to the Web. To accomplish this, they need to integrate their existing business systems which supports these processes, with the Web. These applications are known as self-service applications - they are starting to emerge as the "killer" applications for the Internet. Frequently they increase customer satisfaction, reduce costs and increase revenue at the same time. A recent IDC study showed that companies which implemented self-service applications realized cost savings of 50-90%. Java is the natural choice for these applications for two reasons. First, applications written in Java can be executed on all popular platforms and with both Microsoft's and Netscape's browser - Netscape does not support ActiveX. Second, Java applications can be automatically downloaded from the server. One Hundred Percent Pure Java applications reach the largest possible audience and eliminate the need to install application specific code on the users PC.
- **Lower cost of ownership** - Customers are frustrated with the high cost of building and maintaining client-server applications. Gartner estimates that the total cost of ownership of a networked PC is between \$10,000 and \$15,000 per year. Deploying Java applications will significantly reduce these costs with:
  - ✓ **Zero administration clients** - Installing and maintaining applications on each PC is one of the largest components of the total cost of ownership. It is also a slow process - which makes it impossible to rapidly deploy new applications. Java applications can be automatically downloaded from the server - no application specific code needs to be installed and maintained on each users PC - significantly reducing costs. Customers can rapidly deploy new applications as well as new releases of existing applications. Sun calls this feature of Java, Zero administration clients, which is a bit of an exaggeration but it makes the point.
  - ✓ **Lowering development costs** - Java's "write once, run anywhere" capability reduces development costs by eliminating the need to port the application to multiple platforms. Also, programmers that have moved from C and C++ to Java have consistently reported significant productivity gains even with the crude Java development tools that are currently available. As the tools mature, the productivity gains will continue to grow.
- **Investment Protection** - Customers can reap the benefits that Java provides with their existing hardware and software environment.

The first significant business applications written in Java are just starting to be deployed. Most of the initial applications are front ends to existing business applications. The early adopters have reaped many of the benefits described above. They have also experienced some significant obstacles. These obstacles

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<sup>3</sup>"Java Reinvents Software," *Software Strategies*, Forrester, April 1997.

must be eliminated if Java is to emerge as the de facto industry standard for building network centric business applications. Some examples are:

- **CSX** - CSX, one of the leading international transportation companies with a 10.5 billion dollars revenue for 1996, wanted to leverage the Internet to create a better relationship with its customers. CSX built a Java interface to its existing backend system that lets its customers place shipping orders and track their shipments. In addition to creating a strong tie with its customers CSX saved 5 million dollars and two of their customers saved 10 million dollars. This is the most ambitious Java production application to date with 350,000 lines of Java code. Application code defects are down 30% vs. traditional programming languages. CSX is committed to a Java enterprise strategy because Java delivers lower cost of ownership, centralized administration, platform independence and applications can be deployed incrementally. The first phase of this project was done with Sun's systems integration group. CSX is moving to the next phase which will require a more complex real time environment - IBM is the systems integrator for phase two.
- **Reuters** - Reuters runs a private network that supports 375,000 terminals on its customers' premises. It wants to use Java to build modular applications that can be automatically upgraded without the need for on-site support. Reuters has been frustrated with its Java development effort because of inconsistencies in Java implementations on different platforms. "Write once, run anywhere" is an unfulfilled promise. Despite the problems that Reuters has experienced with Java, it continues to use Java instead of ActiveX because its customers believe that Java is much more secure than ActiveX.

Customers want 100% Pure Java to succeed because it provides significant value and it reduces their dependency on Microsoft. At the same time, these customers want to bet on the winner. Many are waiting to see if Java or ActiveX emerges as the leader before they make a significant commitment.

The Java coalition must make several things happen before the majority of customers will standardize on Java. First, the Java coalition must quickly fix the technical problems and deliver on the promise of write once, run anywhere. Right now, Java is enjoying a honeymoon - the first release of any new platform is expected to experience technical problems - if the following releases don't make significant improvements, Java will get a bad reputation and the opportunity will be lost. Second, we must get customers to build and deploy their first Java application. Self-service applications provide a compelling business reason for that will help drive the momentum. Finally, strong ISV support is critical.

### **Will commercial application developers standardize on Java?**

The Java market is likely to develop similar to the way that the client-server market did. In the early stages of client-server, 80% of the revenue was from custom applications and only 20% from packaged applications. After vendors gained experience and built a portfolio of reusable components, they changed their business model to the higher volume, higher margin software business model. SAP, Oracle Applications and PeopleSoft, all started as custom applications. Commercial application developers are divided into two groups: custom application developers and packaged software ISVs.

- **Custom Application Developers** - This group includes the large systems integrators as well as smaller VARs who write custom applications. Designing and building self-service applications in Java is a major revenue opportunity. Larger systems integrators including IBM, Anderson, EDS and Perot Systems are developing Java skills and have begun to perform a number of Java application development engagements. At the same time, they will all continue to build ActiveX applications.
- **Packaged Software ISVs** - Most of the ISVs have significant investments in their existing code base and will not rewrite their applications in Java. Most of the them are taking a wait and see attitude

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toward Java and ActiveX - they have one foot in both camps and are waiting to see which one emerges as the winner before they make a significant commitment to either. However, 55% of them are already doing some Java development work. For example:

- ✓ **Corel** - Corel was one of the first major application vendors to commit to Java. Corel Office for Java, a personal productivity suite built with Java, is in beta - the product is scheduled to ship this summer. The suite includes a word processor, spreadsheet, presentation graphics and personal information manager. The initial release of the product is targeted at Network Computer (NC) and occasional Office users - it will not have the functionality or the performance required by power users. The key benefits are significantly lower cost of ownership due to lower hardware requirements and zero administration clients.

Corel had trouble with inconsistencies in Java implementations on different platforms. Despite these problems, Corel remains a strong supporter of Java. Corel calls Java "the operating system for the next 10 years". Corel has had a tough time competing against Microsoft in the Windows Office Suite market and views Java as a new market opportunity where they have a chance to lead by entering the market early. Corel's major competitors, including Lotus (Kona), StarDivision, and Applix, have followed Corel's lead and have announced plans to market a Java Office suite. It is widely rumored that Microsoft is hedging its bets and building a Java version of Microsoft Office as well.

- ✓ **SAP** - SAP is the leading provider of client-server business applications including financials, human resources, sales and distribution and manufacturing. SAP has had a long standing partnership with Microsoft and remains committed to Microsoft technologies including ActiveX. However, SAP responded to competitive pressure and customer demand and shipped a Java client in the latest release of its flagship R/3 product. SAP continues to enhance and support a full range of native client implementations including Windows, OS/2, Unix and MacIntosh. The native client implementations are full function and provide a better user interface than the Java client. The Java client is targeted at Network Computer (NC) users and customers who want to take advantage of Java's zero administration client capabilities.

SAP also used Java to Intranet and Internet enable its applications - opening up these applications to thousands of potential new users. These self-service modules let occasional users such as employees, managers, customers, and suppliers - process a travel expense account, place an order, inquire about a product or service, review their invoice, and/or submit a purchase request.

All of SAP competitors including Oracle Applications, Baan, SmartStream (formerly Dun and Bradstreet) and PeopleSoft have either shipped or plan to ship Java clients and a set of Java self services add-on modules.

Many ISVs would like to see Java succeed - Java will deliver significant benefits and reduce Microsoft's influence in the industry. Java will lower their development costs, expand the market for their applications by reaching more platforms, and make it easier for their customers to deploy their applications. However, most of the ISVs are waiting to see if Java or ActiveX emerges as the leader - ISVs that have bet against Microsoft in the past have lost. The decision to support Java or ActiveX is purely a financial decision. If the early Java adopters are able to generate additional revenue and/or experience significant cost reductions, other ISVs will follow.

### **How is Microsoft planning to get control of Java?**

Java represents a tremendous threat to Microsoft. Java will accelerate the move to just-in-time component-based applications, which threatens Microsoft's primary source of revenue and profit - Microsoft Office. Also, Java's promise of "write once, run anywhere," has the potential to destroy their Windows's architectural lock-in with users and ISVs. Microsoft's strategy is based on the assumption that it will be able to maintain and extend this lock-in - which implicitly assumes that all of Microsoft's competitors will fail.

Almost a year and a half ago, in a surprise move, Microsoft licensed Java from Sun. Java was gaining momentum with developers and Microsoft decided that it was better to embrace Java than try to fight the trend. Microsoft believed that they could get control of Java by embracing it as a language and extending it with proprietary Microsoft interfaces like ActiveX. The idea was to offer programmers the best of both worlds, the advantages of Java with the maturity and investment protection of the Windows platform. This strategy has not worked. The market place has portrayed Microsoft's strategy as Java vs. ActiveX. Java continues to gain momentum and Microsoft finds itself on the wrong side of a key industry trend, which is causing a deterioration in their image with developers.

Microsoft is evaluating its Java strategy. There is a heated debate within Microsoft on what direction it should take. Regardless of which path Microsoft chooses, its goals will not change - its leaders are merely debating the best tactics. Microsoft's success is based on strong support from two segments: individual end users and individual application developers. Netscape is threatening their preeminent position with users and Java with application developers. To address these problems Microsoft's goals are to:

- **Keep control of the desktop:** Maintaining control of the desktop is important to Microsoft for two reasons. First, it is the source of tremendous mindshare - the first thing that most PC users see every day is the Microsoft logo. Second, Microsoft has been able to successfully leverage their dominance on the desktop into a leading position in adjacent markets - NT is a good example. One of the key value propositions of the NT Server is the synergy with Windows desktops. Client-Server application developers, who build their applications on Windows clients and NT servers, have a single programming model on the client and server parts of their application. Microsoft has also created proprietary hooks between Windows desktops and NT servers - it is difficult for other server vendors to provide equivalent performance and functionality. If client-server application developers standardize on Java, this key leverage point is lost.

At first glance, Microsoft's domination on the desktop never looked more secure. Both of its traditional rivals, Macintosh and OS/2, are in decline. However, applications written to Java and new devices such as Network Computers (NCs), with Java desktops, have emerged as a significant threat. Microsoft is aggressively trying to deal with both problems and is focused on:

- ✓ **Eliminating Netscape** - Java's rapid rise in popularity was due in large part to the fact that Netscape bundled Java with the Netscape Navigator browser. Navigator has an installed base larger than any single PC application including Microsoft Office. By bundling Java with Navigator, Java quickly became pervasive - millions of seats were Java enabled in a matter of months. This attracted the ISVs and Java was off to a quick start. If Microsoft can eliminate Netscape, Microsoft will be the highest volume distribution channel for Java - by far - which will give it effective control of the Java standard.

Microsoft is trying to commoditize Netscape's primary revenue sources: Browsers and Web servers. Microsoft's browser and Web server are both very competitive products and both are free. Microsoft's anti-Netscape strategy is starting to show some impact. Microsoft's has gone from

zero share to a 28% share in less than a year and its server share went from 0 to 16% in a little over a year. Netscape's share has declined from over 80% to 70%<sup>4</sup> and its server share has declined from 13.7% to 12%.<sup>5</sup> Netscape revenue has continued to grow and it has remained profitable. However, Netscape's market capitalization has declined dramatically from a 52 week high of 6.8 billion to 2.7 billion dollars today - a 60% reduction.

✓ **“Control” the Network Computer (NC) market** - The high cost of ownership of PCs has led to an extremely high interest in NCs. Meta estimates that 30% of the clients shipped will be NCs by the year 2000 - which would significantly reduce Microsoft's position. Microsoft, which initially dismissed the NCs, has responded with three different initiatives. The first is the NetPC, which is a closed PC bundled with management tools, designed to significantly reduce the cost of PC ownership. All of the major PC manufacturers have announced plans to build NetPCs. Secondly, Microsoft recently announced the Windows Terminal, which is “designed” to significantly undercut the Network Computer's cost of ownership. This was a hastily arranged announcement - no PC or terminal manufacturer has signed up to build a Windows Terminal. The general consensus in the industry is Microsoft has done very little technical work on this product. Finally, Microsoft is in the process of acquiring WebTV for 425 million dollars. Specialized consumer devices will be the highest volume category of NCs - WebTV is the first commercially successful consumer device for accessing the Internet. JavaSoft has been working closely with WebTV to integrate Java into their offering.

• **Keeping the ISVs in the Microsoft Camp** - by gaining control of Java. Their key objectives are to:

✓ **Eliminate JavaSoft** - Microsoft will try to eliminate JavaSoft by building and aggressively marketing a Microsoft version of the Java Virtual Machine (JVM). The JVM is the code from JavaSoft, which is licensed to all of the platform suppliers including Microsoft, that is required to execute Java applications. We believe that Microsoft is working on a “clean room” implementation of the JVM and is porting it to multiple platforms. A clean room implementation is a clone of JavaSoft's JVM that is built by programmers with no knowledge of internals of the JavaSoft implementation. It can legally duplicate the functions of JavaSoft's JVM as long as it doesn't copy any of the code. The PC clone market was created when Phoenix Technologies created a clean room implementation of the IBM BIOS and licensed it to PC clone manufacturers.

Microsoft will aggressively market these JVMs to other platform vendors. If it can produce JVMs that significantly outperform the one supplied by JavaSoft, as it has already done for Windows, it might be able to put JavaSoft out of business. Platform vendors who don't ship the Microsoft version would be at a competitive disadvantage.

✓ **Dominate the Java Tools market** - Microsoft will attempt to become the dominant supplier of Java tools. Today's Java tools and class libraries are crude - Microsoft is going to quickly deliver a set of tools and class libraries that will make the Java programmers life much easier. If the majority of Java applications are built with Microsoft tools and class libraries Microsoft will effectively have control of the Java standard.

✓ **Attract Java ISVs** - Microsoft has recently announced a Java ISV program. The program includes extensive technical support and demand generation programs designed to generate sales for the ISVs products. Today, almost all Java developers will qualify for the program. Over time Microsoft will likely limit the program to ISVs that exploit key Microsoft technologies. If Microsoft is

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<sup>4</sup>Zona Browser Census, January 1997.

<sup>5</sup>Netcraft Web Survey, May 1997.

generating a significant percentage of the demand for the ISVs product, the ISVs will adopt the Microsoft technologies.

Microsoft undoubtedly has the motivation and expertise - both technical and marketing - to execute this strategy. The primary obstacle to its success is its history and its image. There is strong mistrust of Microsoft in both the ISV and customer communities. However, ISVs and customers are very practical - if there is no other viable alternative, Microsoft will prevail.

### **What is Sun doing to capitalize on Java's success?**

Sun's has been very effective at leveraging Java to drive sales of Sun servers. Sun dominates the Internet server market and its strong brand association with Java helps it maintain its share in this segment. Sun is trying to use Java to expand into other segments. It has launched a major effort to use Java as the lever to help it become a major player in the enterprise server market - directly attacking both IBM and HP. Sun has some significant advantages as well as significant disadvantages that it needs to overcome. Sun's advantages includes its dominance in the Internet server market and its strong brand association with Java. The obstacles to Sun's success include its weak systems integration organization and that it is not currently viewed as an enterprise server vendor. Sun is building up its systems integration arm and working with all of the major systems integration firms. Scott McNealy is personally making calls on many of our large customers, to get them to deploy enterprise Java applications hosted on Sun servers. In order to start to build momentum, Sun has been offering customers free programming services and support.

A recent Prudential Securities Investor report on Sun commented "We think Java is worth between \$5-\$15 per share and that this is ignored in the current stock valuation....and we believe Sun, at this price level, may find itself becoming a takeover target."

### **What is IBM doing to promote and capitalize on Java's success?**

Our strategy is summarized in the box below. The first three initiatives were outlined in the original Java strategy paper last July - some of the wording has been revised to clarify our objectives. Two new initiatives have been added - one on services and the other on marketing and selling Java based solutions. In this section, we will summarize some of our key accomplishments and our focus items for the next 12 to 18 months.

Our goal is for IBM and our partners to provide the leading platform on which network business applications will be built and deployed. Our strategy is focused on the following:

- **Initiative 1: Establish Java as the open industry standard platform for building network centric applications.**
- **Initiative 2: Establish IBM as the premier supplier of middleware and tools required to build, deploy and manage Java applications.**
- **Initiative 3: Establish IBM as the premier system platform for deploying Java applications.**
- **Initiative 4: Establish IBM as the premier services partner for building and deploying Java applications.**
- **Initiative 5: Aggressively build, market and sell integrated Java based solutions.**

***Initiative 1: Establish Java as the industry standard platform for building network centric applications.***

Java has the potential to create significant hardware, software and services revenue opportunities for IBM. Most of these opportunities will not be realized if Java does not emerge as an open cross platform standard for building network centric applications. We are working with the industry to help create and maintain the Java standard. In the last 9 months we have been focused on:

- **Extending Java into a platform for building network business applications** - In the initial release of Java, the cross platform capabilities were limited to simple applications which are primarily used to enhance the user experience on a Web site. Building more sophisticated applications required programming calls to the underlying operating system, which destroyed one of Java's primary benefits - cross platform support. Significant enhancements were required to support sophisticated network centric business applications.

IBM and other industry leaders supplied technology to JavaSoft to quickly extend Java's capabilities. According to Alan Baratz, President of JavaSoft, "IBM is one JavaSoft's most significant and influential allies, and has done a great deal to spread the adoption of Java, not only in the enterprise, but in every facet of computing." IBM has provided technology in almost every key area. For example, Taligent provided the national language support (NLS) and some user interface class libraries. IBM Austin and Lotus provided much of the technology for JavaBeans, the component model which competes with ActiveX. Hursley provided the technology for accessing transaction systems. We have also worked closely with JavaSoft on architectural directions and defining key APIs.

When IBM provides technology to JavaSoft, we are retaining the intellectual property rights necessary for IBM to continue to employ it in our own products and ensuring long-term access to any extensions or modifications JavaSoft makes to the technology. We are also considering how IBM can best capitalize on future technology contributions. For example, we would like to use them to create dependencies by JavaSoft on IBM.

- **Maintaining a single Java standard** - One of the main drivers of Java's momentum with ISVs is the potential market for their Java applications is greater than the market for Windows applications - due to the fact that Java applications run on all popular platforms including Windows. Any fragmentation of the Java standard destroys this advantage and Windows will remain the most profitable platform for ISVs. In addition to Microsoft, there have been two additional sources of fragmentation:
  - ✓ **Poor quality control** - There are between 60 and 70 Java implementations - an application that runs on one implementation does not necessarily run on another - leading many to label Java "write once, test everywhere." This problem has arisen from the way JavaSoft licenses and distributes Java. Each licensee takes the Java reference implementation from JavaSoft and ports it to its environment. The licensees are free to make any changes to the source code - the only requirement is they must self-certify that their port passes the JavaSoft compatibility test suite before they ship it. The initial compatibility tests were not extensive enough to guarantee compatibility. Initially there were 200 test cases - IBM and others have provided additional test cases - the total number of required test cases is now over 8,500. We believe that these test cases will significantly improve but not totally eliminate this problem. We are continuing to refine the test suite to assure complete compatibility.
  - ✓ **Netscape** - Writing an application to the native Java API is very tedious and time consuming. In object oriented environments, like Java, this problem is solved by creating a class library. Class

libraries are a set of predefined objects that the programmer uses to create his/her application. Since the programmer is writing to the class library interfaces rather than the basic Java API - the class libraries become the control point. The initial class libraries that were shipped with Java were extremely poor - JavaSoft was not addressing this problem in a timely manner.

Netscape built its own class library, the Internet Foundation Classes (IFC), and began to aggressively promote it to the ISV community. We worked at all levels in Netscape and JavaSoft to convince them not to fragment the Java standard and converge their efforts. After several months of negotiation, we finally reached an agreement on April 1. On April 2, the day that Microsoft's competing class library the Application Foundation Classes (AFC) went into beta, IBM, Sun and Netscape jointly announced the Java Foundation Classes (JFC) - which combined the efforts of all three companies into a single class library. This was a major blow to Microsoft, who has built their strategy around AFC. It will now be much more difficult for Microsoft to establish AFC as a standard.

- **Creating a pool of skilled Java Programmers** - Java's success requires a large highly skilled pool of Java programmers. We jointly sponsored the Java Education Tour with Sun, Netscape and Novell. This is a 40 city worldwide tour, which has attracted over 10,000 attendees to date and is drawing more developers than we expected. It is a one day introduction to Java - additional training is required. We are offering follow on education in multiple formats. These include free online education on our Web site, a computer based training course on CD-ROM and IBM classroom education. We are also jointly sponsoring a Java programming contest with ACM, which is designed to encourage university students to build their Java skills. When these students graduate they will increase the pool of qualified Java programmers.

We are focusing on accomplishing the following objectives in the next 12 to 18 months:

- **Work with JavaSoft to deliver on the promise of write once, run anywhere** - Java is maturing as a platform much faster than any previous platform. However, Java's promise of write once, run anywhere is not yet a reality. Additional development work on both the client and the server is required.
- ✓ **Ensure that programmers can build competitive cross-platform client applications in Java (particularly on Windows)** - Most of the initial applications that have been written in Java are new front ends to existing business applications, which extend their reach to new sets of users inside and outside of the enterprise. Java has not yet matured to the point where clients written in Java deliver the same level of performance and usability as clients written to the native operating system API. We are working with JavaSoft to address the key obstacles: performance, the ability to create high quality user interfaces, security and consistency of the JVM implementations across platforms. By the first half of 1998 we believe that most client applications that are written in Java will be competitive with native implementations - although there will always be some computationally intensive applications that will require writing to the native operating system API.
- ✓ **Expand Java to the server** - NT servers are growing rapidly, but today it is still one of many server alternatives. We need to establish Java as the industry standard development environment for building server applications before NT becomes the dominant server.

The server side of the application differs from the client in two important ways. First, most server applications are built on top of a relational database and/or other middleware products like transaction monitors. Today, most middleware vendors have their own proprietary APIs. Delivering on the write once, run anywhere promise, requires a common interface to these

middleware products. We have been working closely with JavaSoft and major middleware suppliers like Oracle on the design and implementation of "Java for the Enterprise" which addresses this problem. Second, extremely high performance and scalability are critical. IBM Research and the Toronto lab have been working on a project known as High Performance Java (HPJ). HPJ is a Java compiler for server applications that significantly improves the performance. HPJ is currently in alpha.

By the end of 1998, it will be technically possible to write competitive server applications in Java.

- **Prevent Microsoft from getting control of Java** - Microsoft is the biggest threat to Java's success. We must work jointly with JavaSoft and other industry leaders to ensure that there are viable alternatives to Microsoft's offerings. The key to our success will be our joint ability to quickly extend Java, maintain a common Java standard and move at the same pace or faster than Microsoft. Our focus is in the following areas:

- ✓ **Maintain Netscape's Browser Share** - Netscape's browser is the high volume distribution mechanism that prevents Microsoft from owning the Java standard. We must help Netscape maintain a significant presence on the desktop. Unfortunately, this may be both damaging to Lotus and expensive. Several months ago Netscape made a major shift in their strategy and focused their company on competing directly with Lotus. They have enhanced and renamed their client to Netscape Communicator, which includes functions which are only supported on Netscape's servers - selling Communicator makes it more difficult to sell Domino. Microsoft is also including proprietary functionality in their browser, Internet Explorer. We are negotiating with Netscape to eliminate this problem by unbundling the proprietary functionality. We are making progress in the negotiations but the issue is not closed.

Microsoft is making it difficult for Netscape to get the PC manufacturers and the Internet Services Providers, like IGN, to package Netscape's browsers with their offerings. Microsoft is offering a significant amount of co-op advertising dollars to vendors who exclusively support Internet Explorer. PC company and IGN may not be able to afford to continue to bundle Netscape with their offerings. There is a task force led by Bruce Harreld that is currently looking at these issues.

- ✓ **Ensure that the Java coalition does not compete on APIs** - All of the vendors in the Java coalition are both our partners in driving Java's success and our competitors in delivering products that help customers build and deploy Java applications. If we start to compete on APIs, we will fragment the market and Microsoft will be the most profitable choice for the commercial application developers. If all of the major vendors continue to agree on the API, the entire industry is Microsoft's competitor - which will be much harder for it to beat than any individual vendor. Most of the major vendors, with the exception of Netscape, have lived through the fragmentation of Unix and are committed, for now, to compete on the basis of product functionality vs. APIs. If the Microsoft threat starts to lessen, there will be a natural tendency for individual vendors to try to create an architectural lock in. We will continue to work with the major vendors in the industry to try to ensure defacto industry standards.

JavaSoft has recently started the process to get Java accepted as an official industry standard through the International Standards Organization (ISO). Establishing a de jure standard through a standards body is a slow process - JavaSoft has found an ISO process called Publicly Available Specification (PAS), which is a fastpath through the normal process. This is the first time that a company, rather than an industry consortium, has tried to use this process. It has created an industry controversy - Microsoft and Intel have publicly protested this approach. IBM has supported JavaSoft with reservation.

- ✓ **Maintain a single NC software standard** - The Network Computer (NC), with Java desktops, represent the best chance to reduce Microsoft's dominance on the desktop. The success of the NC requires a rich portfolio of applications, most of which will be built by the Java ISVs. Java applications *must* run on all client platforms (Windows, MacIntosh, OS/2, etc.) including the NCs from all of the hardware manufacturers - otherwise the NC will not represent a large enough market to attract a sufficient number of ISVs.

Accomplishing this goal creates some additional technical and business challenges:

- ☑ First, the NCs need a desktop for the user to launch applications. Three "webtops" have been built, one from JavaSoft, another from Lotus and the third from Netscape - each with a different APIs - a program written for one will not run on the other. Agreement on a common API set is required to eliminate fragmentation.
- ☑ Second, each NC manufacturer is integrating with the network and server environment with their own interfaces - an IBM NetStation will not work in a Sun JavaStation environment and visa versa. We are working with the major players, Sun and Oracle, to agree on a standard.
- ☑ Third, NCs can only execute Java applications and there are no competitive browsers, which are built in Java. Sun has a Java browser but it is not competitive. We are working with Sun and Netscape to get a competitive Java browser. An "industry" of Browser plug-ins has grown up around Netscape's and Microsoft's browsers - we must create enough momentum to get these ISVs to build "plug-ins" for the Java browser as well.

***Initiative 2: Establish IBM as the premier supplier of middleware and tools required to build, deploy and manage Java applications.***

Java is accelerating the move from a traditional client-server application model to a network centric model. This shift creates an opening that we can exploit to establish our middleware portfolio as the leading platform for building for network centric applications. Java also gives us an opportunity to significantly increase our share of the tools market. The Java tools market is expected to grow to 800 million dollars by the year 2000.

We have 2,400 Java programmers across 24 sites who Java enabling virtually our entire product line. On April 15th we announced the Network Computing Framework, which is a comprehensive set of products for building, deploying and managing network centric applications. The framework brings together products from IBM, Lotus, Tivoli and Transarc united by a common Java programming model. This announcement was well received by both the press and consultants - Gartner called it "the most cohesive software vision from IBM in decades." Key elements of the framework are:

- **e-Business Application Servers** - a family of Web servers that addresses the full range of customers needs from establishing a basic Web site to building mission critical data and transaction applications on the Web. Members of the family include Lotus Go (an enhanced version of the IBM Internet Connection Server), Domino Mail, Domino, DB2 Universal Database and the IBM Transaction Series.
- **e-Business Enterprise Connectors** - Many customers want to extend their existing applications and/or data to the Internet. The e-Business Enterprise Connectors provide the linkage between the existing applications and the Web.
- **e-Business Enhancers** - The enhancers provide basic infrastructure for this new style of network centric applications. Products in this category provide security, scalability and easy administration.
- **e-Business Developer Tools** - Our goal is to significantly lower the cost and time required to build network centric business applications. By basing our technical strategy on JavaBeans, the component model for Java, customers will be able to build applications faster with less skilled developers than is

required by traditional methods. Applications are constructed from a set of parts. Most applications will be constructed from a combination of existing parts and parts that are unique to that particular application. The highly skilled programmers will be able to focus on building the unique parts - lower skilled and less expensive developers will assemble the application from the parts. IBM was the first vendor in the industry to announce and beta a complete set of tools for building JavaBean based applications. One of the eBusiness Developer Tools is VisualAge for Java, which recently went into beta. A review of the beta in InfoWorld concluded "...VisualAge for Java could nudge Symantec's Visual Cafe Pro out of the No. 1 spot for Java development."<sup>6</sup>

We have made tremendous progress toward our goal of establishing IBM as the leader in this space. When we started the Java effort, last July, IBM was not even recognized as a player. In a recent analysis of key players in the Java market, Gartner listed IBM/Lotus along with Sun/JavaSoft, Microsoft and Netscape as the leaders. However, we are in fourth place.<sup>7</sup> Our challenge is to move IBM into the undisputed leadership position.

We are currently focused on enhancing the products in the Network Computing Framework with the following:

- **Enhanced performance and scalability** - Many of the network centric applications require access to existing backend applications and data. We are enhancing the eBusiness connectors to provide access to all of the functionality of the backend system and increase the performance to support the increased workload that we expect customer will require. Delivering this functionality requires extensive technical knowledge of how to distribute workload across the network. These are the types of problems that IBM has been solving for decades. By applying our skills to the Web and Java, we will be able to create significant IBM competitive advantage.
- **Integrated systems management** - Network centric applications execute on the client and the server, or more accurately, across a network of servers. Effectively managing this complex environment requires extensions to our systems management product line. Java and Network Computers (NC) further complicates the situation. NCs, which are managed entirely from the server, create additional requirements, such as remote debug, on the server infrastructure. The just in time delivery of Java applications puts additional demands on the networking infrastructure such as the need for client caching. The Blue Ribbon Task Force has identified the actions required to address these issues.
- **Fully integrated design and development tools** - Building network centric applications, which span multiple systems is complex and requires the use of multiple tools. We are integrating the IBM tools to make this process easy for developers. We are going to provide a common user interface and easy interchange of data between the tools. We will have integrated authoring tools for that are good enough for novice users but are excellent for enterprise deployment.

*Initiative 3: Establish IBM as the premier systems platform for deploying Java applications.*

If Java becomes the platform of choice for building network centric applications, all platforms will have the same portfolio of ISV applications. Customers will no longer make their platform decisions on the basis of the platform's application portfolio - they will make them on the merits of the platform itself. The strong value proposition of the IBM platforms will lead to increased IBM share.

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<sup>6</sup>"Fat VisualAge for Java is great for creating thin applications," InfoWorld, April 1, 1997

<sup>7</sup>Intersearch Corp. Internet Image Tracking Survey, March 1997.

Our focus has been on porting Java to the IBM platforms: OS/2, AIX, MVS and OS/400. Today, Java is available on all of the platforms. Customers and Business Partners are actively working with Java on all our server platforms. For example, 130 customers have registered for the S/390 Java Beta program and we adding 1 to 2 new customers per day. There have been over 4,000 downloads for OS/400. Customers are beginning to develop experience with Java and are prototyping Java server applications.

Our goal is to fully integrate Java into each of our platforms - giving customers the same level of reliability, scalability and performance that they expect from the IBM platforms. To accomplish our goal we are focused on:

- **Performance and Scalability** - The performance of Java applications must approach that of native system performance. Today, performance on our platforms is a challenge. The reference port we receive from JavaSoft is optimized for the UNIX environment. AIX leverages this fact and offers good Java performance. The other servers have performance issues; techniques for improving performance are known and work is underway to define the best implementation for each platform.

The benchmarks available today for Java are client-focused. Performance benchmarks of commercial server workloads are required to better understand Java's performance characteristics on IBM and competitive servers. We are beginning the work to define server benchmarks and our objective is to establish our benchmarks as the industry standard.

- **Reliability, Availability and Serviceability (RAS):** This is one of the primary value propositions of IBM servers. Our goal is to deliver a stable, reliable, application deployment environment and with the same level of RAS for Java applications that our customers have come to expect from traditional languages on our platforms. We will also deliver enterprise-class support, which will be a key IBM differentiator.
- **Security:** Security continues to be one of the customer's key issues - in a recent survey 37%<sup>8</sup> mentioned security as the single biggest concern. The existing Java security mechanisms are client-oriented. We are working with JavaSoft to extend Java's security model to meet commercial server requirements. Once accomplished, we will integrate it with our existing security mechanisms on each platform and promote it as a key differentiator.
- **Platform integration:** Our platforms provide many facilities such as transaction and database services, which many customer applications exploit. We are enabling Java to access these services so that customers can take full advantage of their existing facilities on our platforms.
- **Time-to-market** - JavaSoft's goal is to deliver a new Java release every six to nine months. The reference platform that we receive from JavaSoft is optimized to UNIX. We have to port JavaSoft's code to each of the IBM platforms. The last release which we got from JavaSoft was ported to AIX in 48 hours. It is much more difficult to port to the other IBM platforms, which is causing the IBM platforms to lag behind competition. We have identified changes that both IBM and JavaSoft can make to lessen this problem. There are still some significant issues that need to be resolved.
- **Tools** - Commercial application developers are going to use a variety of tools to build their applications. Our objective is to get many of the popular Java tool vendors to support the IBM platforms. This includes support for platform unique functions such as transaction services as well as the ability to debug applications on the IBM platforms. Many of today's Java tools are being targeted to the high volume Microsoft platforms. It remains a challenge to attract popular Java tools provider ISVs to target the IBM server platforms.

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<sup>8</sup>Intersearch Corp. Internet Image Tracking Survey, March 1997.

- **Marketing** - Sun has been very successful at using Java as a lever to drive Sun server sales. We are going to further integrate Java into our marketing, PR and business partner programs.

***Initiative 4: Establish IBM as the premier services partner for building and deploying Java applications.***

The original Java strategy that we submitted last July did not include an initiative on services. We have added it because services represents a significant revenue opportunity and a strong services offering combined with hardware and software offerings give IBM some unique advantages, which will be discussed in the Initiative 5 section. The Internet/Intranet services market was over 2 billion dollars in 1996 and is expected to reach almost 14 billion by the year 2000. In 1996, 52% of the services revenue was for building new Internet applications or connecting existing applications to the Web. Java is a natural language to use to build these applications.

Currently we have approximately 350 Java programmers in IGS. In addition, there are approximately 3,000 people with related Object Oriented skills in IGS, that can be quickly trained in Java, as the demand warrants. We are working on a number of early Java engagements including Columbia House, State Farm and Econometrics. IBM Global Services is taking a number of steps to ensure our leadership position in this field including gathering better market intelligence data and building up our Java skills (architects, programmers, project managers and consultants). We will also form alliances and partnerships to extend our brand and create a Java Center of Excellence to coordinate Java activities throughout IBM Global Services.

In addition to traditional IGS services and consulting, the development labs are beginning to pilot product specific services to drive product demand and acceptance. Both OS/2 and Visual Age for Java have created small, highly skilled design and programming teams which are able to mentor customers in the use of new products or solve specific problems. An early OS/2 engagement turned a critical situation with Cera Bank into our first Java reference account. While initially free, the demand for these skills has been so high that the teams are now charging for the service. In order to avoid confusion in the market or perceived competition with IGS, the product team's rates are higher than IGS and they have been positioned as subject matter experts from within the development labs. This model needs to be extended to other key Java products. IGS is creating a Java Center of Competency to coordinate engagements and skills deployment across IGS and the labs.

***Initiative 5: Aggressively build, market and sell integrated Java based solutions.***

Java is a catalyst for the transformation to a new network centric style of computing. Our goal is to leverage this technology shift, to significantly increase IBM's share in hardware, software and services. This transformation is just starting and will take several years to fully develop. However, we must establish a leadership position now, in order to capture a significant percentage of the revenue in the future.

To accomplish our goal, we must maintain our share in our traditional enterprise customer base and make significant increases in the large and high growth general business and autonomous departments segments. Autonomous departments are departments that make their own IT decisions independent of MIS. They are important for two reasons. First, they represent a large percentage of the opportunity in medium and large enterprises. Second, in past technology shifts, they have been the early adopters and have set the defacto standards for the enterprise. LANs are a good example. Novell sold LANs department by department. By the time MIS got involved Novell was already the defacto standard - it was impossible for MIS to impose a different LAN standard. PCs, LAN based e-mail, Windows all followed a

similar path. It will be difficult for us to maintain our share in the enterprise segment if we don't establish a significant position in the autonomous department segment.

Our strategy to accomplish our goal is:

- **Create IBM's image as the Java technology and solution leader** - There are two groups that are key to most technology decisions - the business executive and the developers. Each has different concerns and motivations. The executive is focused on the solution and how it will either create competitive advantage and/or reduce costs. The developer is focused on the technology and implementation issues. This group is one of Microsoft's primary target audiences. We must establish a strong positive image with both groups. .

We have three major advantages that most of our competitors lack: an integrated services organization, an industry focus and IBM Research. We can use these to create an image that it will be hard for our competitors to duplicate. We will use services and our industry focus to build our image as a leader in solutions and Research to build our image as the technology leader.

- ✓ **Develop a high visibility reference account in each industry** - Java's high profile has created strong customer interest. We have a list of customers that want to work jointly with IBM to build their first significant Java business application. We are in the process of identifying potential customer partnerships. We will provide special assistance to these customers to help them create a Java application that has high business impact and can be implemented quickly. In return for special attention from IBM, these customers must be willing to be a reference.

Our goal is to get a high profile reference account in each industry. It is no accident that many of the early Java reference applications are self-service applications in the distribution industry. FedEx was the first major company to establish a self-service application on the Web - many of its competitors quickly followed suit. A reference account in each industry will help create cross industry momentum for Java and IBM.

These reference accounts will be the centerpiece of our marketing strategy. Success breeds success - highly visible customer success stories will encourage other customers to invest in their first Java application. We will use PR, advertising and our Java Web site to promote the early customer success stories and IBM's role in that success.

- ✓ **Use Research to create our Java technology leadership image** - IBM is making significant investments in Java research. We promote our leading edge technology with open betas on our Web site and in the press. We are working closely with Research to quickly integrate its work into our products.

- ✓ **Build grass roots support** - We will use the Internet as one of the primary vehicles to reach the Java business application developer. We want to make the IBM Java site a critical resource that they rely on when they are designing and building Java business applications. Our site will contain the latest technical information, on-line discussion groups and beta code. Our objective is to get these developers to visit our site on a regular basis - we will use the opportunity to build IBM's image and "soft sell" them on our latest products.

- **Establish a leadership position with our traditional customer base** - Many of our competitors will use Java as an opportunity to gain share in the enterprise market - Sun is the first, more are sure to follow. If we act quickly, we have significant competitive advantages - if we let Sun and others establish an early lead it will be hard for us to grow or even maintain our share in this segment. We must move quickly to:

- ✓ **Launch an aggressive marketing and sales campaign** - Our goal is to get customers to deploy their first significant Java business application using IBM products and/or services. Our initial focus will be on relatively simple self-services applications. Some of these customers will use in-house developers. We will sell them Java development tools, eBusiness servers, server hardware, NetworkStations and/or technical education. Other customers will hire IBM Global Services to design and build the application. We will leverage the IBM sales infrastructure, including the Partnership Executive Program (PEP) program, hardware and software specialists and Network Computing Centers to get customers to deploy their first Java application with IBM and to block Sun's efforts to establish themselves as an enterprise server vendor. If their first Java application is successful, they will likely deploy more Java applications with IBM products and/or services.
- ✓ **Focus on solutions** - Most of the initial Java applications will be custom solutions that require significant systems integration work. To achieve higher volumes, we must move from custom solutions to solutions that can be mass customized. This shortens the time required to deploy the application and reduces the cost of the solution by reducing the services costs - which will lead to higher volumes.

We are going to use the early customer engagements to build a portfolio of reusable components and to understand the holes in our products. We will drive the individual product owners to fix their products issues. The enhanced products together with the reusable components will provide the foundation for a set of cross industry solutions. We will also work with the ISUs to add industry specific function from IBM or Business Partners to create industry specific offerings. A good example of this approach is San Francisco, which is a set of 149 reusable business processes that is being developed in conjunction over 130 ISVs. This significantly reduces the time and cost of developing basic business applications, such as general ledger.

Delivering these solutions will require joint efforts of IBM hardware, software and service organizations. We are in the process of putting a management system in place that will drive the delivery of these solutions to market quickly. This system will provide a balance between matrix management and speed to market considerations. The management structure will have small executive steering subcommittees which can quickly be called into action to help with funding or prioritization issues. We will also make heavy use of Domino's collaboration capability to coordinate the projects.

- **Grow share by becoming a major player in the departmental and general business segments** - Today, IBM has a relatively low share in both segments. Both segments buy solutions and must be reached through business partners - ISVs and VARs. With the exception of the AS/400 and Lotus Notes, IBM has had a poor track record with Business Partners.

The key to building and maintaining an effective business partner program is to create a profitable business proposition which helps the business partners simultaneously increase revenue and lower costs. We will focus on providing a highly effective demand generation program and provide the best technical support in the industry, which lowers their costs and helps them deliver better service to their customers. We will target:

- ✓ **Existing IBM Business Partners** - This is the easiest segment for us to get to move to our Java product offerings - since we have an existing business relationship. However, as they start to build portable Java applications, it will be easier for business partners to support and market our competitors platforms - many will be in multiple vendors business partner's programs. In fact, many already are - the key to creating and maintaining loyalty is to make the IBM their most profitable relationship - this approach is the basis for Microsoft's success.

Microsoft's message to Business Partners is simple. Microsoft is the high volume supplier which creates the largest possible market for Business Partner's products and services. NT will undoubtedly be the highest volume server platform. However, NT will represent a much smaller percentage of the server workload - due to the fact that most NT systems are low end - the average NT server sells for less than 10K. We must encourage ISVs to move to a workload based pricing model - this will significantly increase the profitability of ISV applications on IBM platforms.

If we limit our focus to the existing IBM business partners we will at best maintain our current share. To grow share we must target developers from the next two segments:

- ✓ **Non-IBM Business Partners** - These business partners have a large investment in an existing code base, which will not be rewritten in Java in the near future - in the short run, Java will not help us get these applications onto IBM platforms. Many of these ISVs will build Java clients for their existing application backend. We start to build a relationship with them by recruiting them into the NetworkStation ISV program. As they build new Java applications, we will try to expand the relationship to include support for IBM hardware and software servers.
- ✓ **Tomorrow's ISVs** - In each major technology shift, major new players are created. Netscape is the best known of this new breed of software companies. New ones enter the market every day. Many of these startups are small and need help in marketing and distributing their products. The Internet is at the center of everything they do. We must use the Internet to recruit and support them. We must also demonstrate that IBM understands the Internet by effectively using it as a marketing, sales and distribution mechanism for IBM and our partners products. We will enhance our Web site to address these requirements.

## Summary

By any measure, Java adoption is moving faster than any previous platform. Java is a significant threat to Microsoft. Java has won the first battle with Microsoft, but the war is not over. In fact, the war has just begun and Microsoft will use all available means to win. IBM must continue to give strong support to the Java coalition to help it deliver on the "write once, run anywhere" promise and prevent fragmentation of Java. The success of Java depends upon ISVs and customers selecting it as the platform on which they build their business applications. This process is just beginning; it is too soon to tell if 100% Pure Java or Microsoft will emerge as the victor. There are three possible outcomes: Microsoft continues to dominate the industry, Java dominates, or a combination of the two. If Microsoft wins, we are back to where we started; otherwise, we are significantly ahead.

We have played a pivotal role in driving Java's momentum. We have contributed a significant amount of IBM technology to JavaSoft and have Java-enabled our product line. To reap the benefits, we must quickly deliver leading edge products and aggressively market them to both our traditional customer base as well as the departmental and general business segments.

## Related Documents

- Java Services Overview
- IBM Strategy for Java on Servers
- Java Technical Strategy
- Java Playbook
- IBM Network Computing Framework for e-Business
- Network Computing - IBM's Architecture for Thin-Client Computing (Blue Ribbon Task Force)
- NCF Tools Solution Specification