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Java Standards:

The Mandate for Interoperability and Compatibility

A META Group White Paper

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Executive Overview

The promise of Java technology is encapsulated in its early catch phrase, "Write once, run anywhere." This has been a difficult promise to achieve, but META Group research finds that organizations using Java technology are seeking to benefit from platform independence and interoperability as well as avoid vendor lock-in. Having applications run unchanged on multiple platforms may be an impossible goal, yet a significant challenge is also presented by vendors "extending" published specifications to achieve competitive advantage.

Although these extensions provide benefits to users (e.g., productivity), they also present opportunities for vendor lock-in. This increases the difficulty for independent software vendors (ISVs), who are either challenged to support desired platforms or must convince users to use the vendor's supported platform. This is especially the case due to growth in ISV use of open source technology to reduce license costs. Vendor extensions also limit the ability to use server consolidation and flexible grid-based licensing for end users. When vendor implementations adhere to standards, ISVs and end users should be free to choose the underlying Java infrastructure software.

For Java technology to continue its growth, a balance must be maintained between new features and compatibility. Compatibility protects IT investments, enabling assets to continue in operation, and leverages interoperability to achieve flexible deployment and reduce integration costs.

Java Technology's Value Proposition

Java technology is now rich and mature and used by a large number of ISVs. META Group research has also found Java technology deployed by more than 70% of all IT organizations. In addition, it is successfully deployed as a hidden technology in a number of devices, including set-top boxes, mobile phones, and automobiles (e.g., BMW iDrive, Nokia Series 60). The popularity of Java technology was established based on three primary tenets: developer productivity, broad vendor support, and portable network-based deployment.

Unlike pure open source models, whose community model may lead to multiple distributions and no defined standard, Java technology combines community with standards and conformance suites. This enables vendors to compete on implementation while ensuring compatibility for users, through use of one standard with multiple implementations. A wide variety of implementations of the core Enterprise Java platform exists, including both open source and closed source, thereby providing users with various options in cost and licensing terms while at

the same time creating an even playing field for providers and ensured compatibility for developers.

A major piece of the business value of Java technology can be encapsulated in the concept of the network effect. The network effect provides a multiplicative value to users based on growth of the ecosystem, including skilled employees, third-party components, and applications (see Figure 1). Without standards that ensure interoperability, single vendors can control the market to limit both competition and the number of players connected to the network as well as reduce its overall value.

Figure 1 — Creating a Value Network

Source: Sun Microsystems
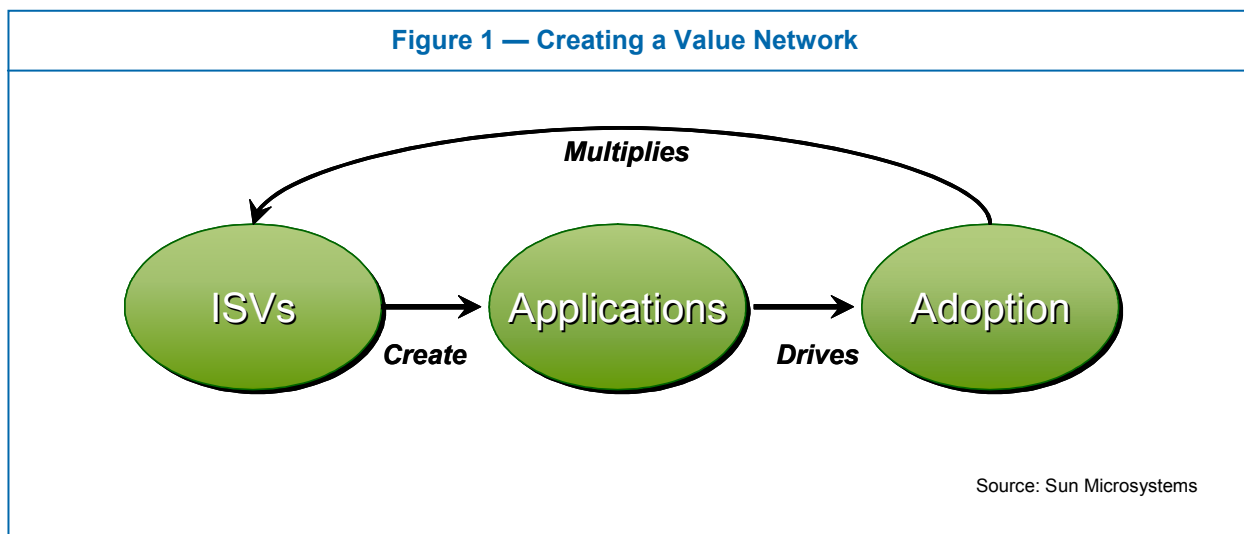
By delivering a technology that can run across a wide variety of devices with a common set of libraries and integration support, Java provides an option for a ubiquitous platform, enabling more efficient use of resources. In addition developers can use their skills across any device supporting the platform. The growth of mobile devices, Web services, and grid computing increases the ecosystem and drives greater value for users and providers.

Microsoft has been able to leverage a similar model with its Windows platform to develop a very broad ecosystem, but unlike Windows, Java technology is designed to deliver this value across a much wider variety of devices and operating systems and with a wider number of suppliers. This increases the size of the potential network and therefore increases the value multiplier.

The creation of an architecture that runs on various hardware and operating system Java technology opens the market for ISVs to target a larger number of customers, while reducing costs to deliver and maintain the software. Although

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ISVs have been able to target multiple platforms in the past, it has required additional effort to port that software.

For an ISV, the network effect is realized when applications can be delivered to a market that has compatible application servers already in place. Therefore, vendor extensions and incompatibilities due to reduced interoperability diminish the network value. In addition, costs are increased for users that may have to maintain multiple application server implementations, learn additional system anomalies, or spend additional money for porting.
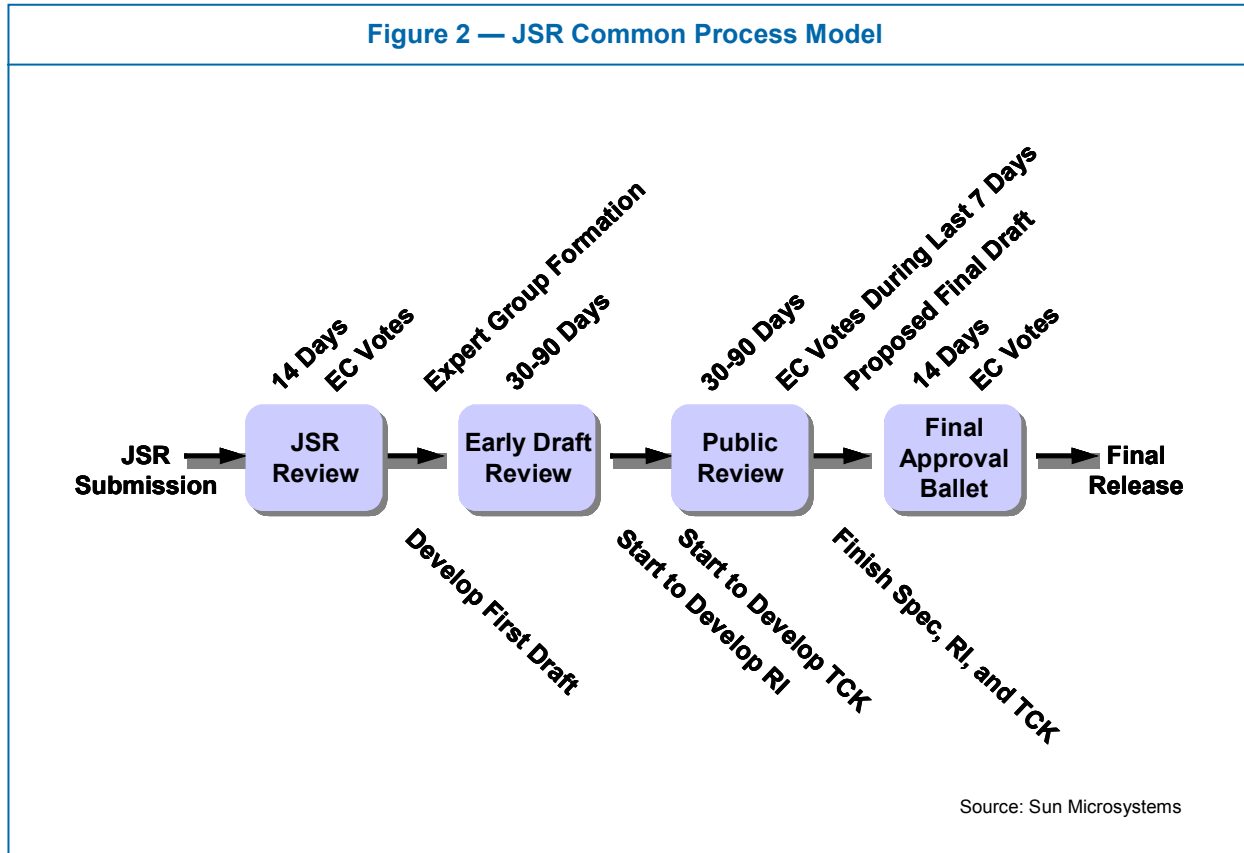
The Java Community Process

To foster the mix of community and compatibility, Sun created the Java Community Process (JCP). This program is designed to define standards and ensure compatibility. Open source may be used for any of the JCP-generated artifacts, but it is not required. The community itself has evolved a great deal since its inception, shifting control from Sun to the JCP participants. Originally, Sun had control over which Java Specification Requests (JSRs) were accepted, owned all copyrights, and maintained control over derivative works. Now the executive committees control the JSR process, and JSR specification leads maintain the copyright. The organization has a nominal membership fee, ranging from free (for individuals) to $5,000/year for commercial entities. This allows a wide variety of participants while keeping a sense of structure and consistency.

The overall process is managed by two executive committees. One group covers the Standard and Enterprise Editions, while the other covers the Micro Edition. The committee members are elected via annual elections, and each serves a three-year term. The committees have the ultimate say regarding the fate of various JSRs, what will be accepted, and which technologies are to be included in the platforms. All standards follow a common process model (see Figure 2).

The process starts when a member submits a specification request (JSR). Each request is reviewed and voted on by the appropriate executive committee. The executive committee has ultimate control over direction of the Java technology platforms. If the committee accepts the proposal, an expert group is formed and work begins on creating an early draft. Expert groups figure out the specification details and then route the specification for both internal and external reviews. After the expert group finishes the edit-and-review cycle, the specification goes back to the executive committee for final approval. Each specification must be delivered along with a Technology Compatibility Kit (TCK) and a reference implementation. These provide the baseline to drive compatibility.

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Figure 2 — JSR Common Process Model

JSR Submission → JSR Review → Early Draft Review → Public Review → Final Approval Ballet → Final Release

- 14 Days
- EC Votes
- Expert Group Formation
- 30-90 Days
- Develop First Draft
- 30-90 Days
- Start to Develop RI
- Start to Develop TCK
- EC Votes During Last 7 Days
- Proposed Final Draft
- 14 Days
- EC Votes
- Finish Spec, RI, and TCK

Source: Sun Microsystems

Compatibility vs. Innovation

One challenge of a standards process is the potential drag it places on innovation. New technologies created outside the community are not hampered by the challenges presented in having to work as a committee. This is true for any technology. In the early going, a small number of individuals will be engaged in the project, which reduces collaboration costs and therefore drives agility. As a technology grows in scope and number of users, its evolution will slow. Part of this is driven by the network effect. A greater number of users and touch points increases the need to maintain backward compatibility. This is especially true for ISVs, who rely on the platform for stability.

It may be faster for organizations to generate new technologies outside of the community process, but if the technologies stay outside of the community, they fragment the platform, making it difficult for ISVs to implement solutions that run across platforms, thereby destroying the network effect. This is most important in areas that are covered by the platform standards.

At the same time, it is important for groups and individuals to innovate outside the standards process. In areas where the platform must evolve to meet new challenges, a broader research community should be free to experiment and not be dragged down by premature standardization (e.g., Jini, JXTA, early Web services efforts).

The JCP itself currently has more than 850 members, with 235 JSRs currently being worked on and approximately 40 new JSRs being started each year. From the standpoint of balancing innovation and standardization, this is a reasonable situation. The Java community itself is much larger than the JCP process (see Figure 3).

Figure 3 — The Java Community

Source: Sun Microsystems
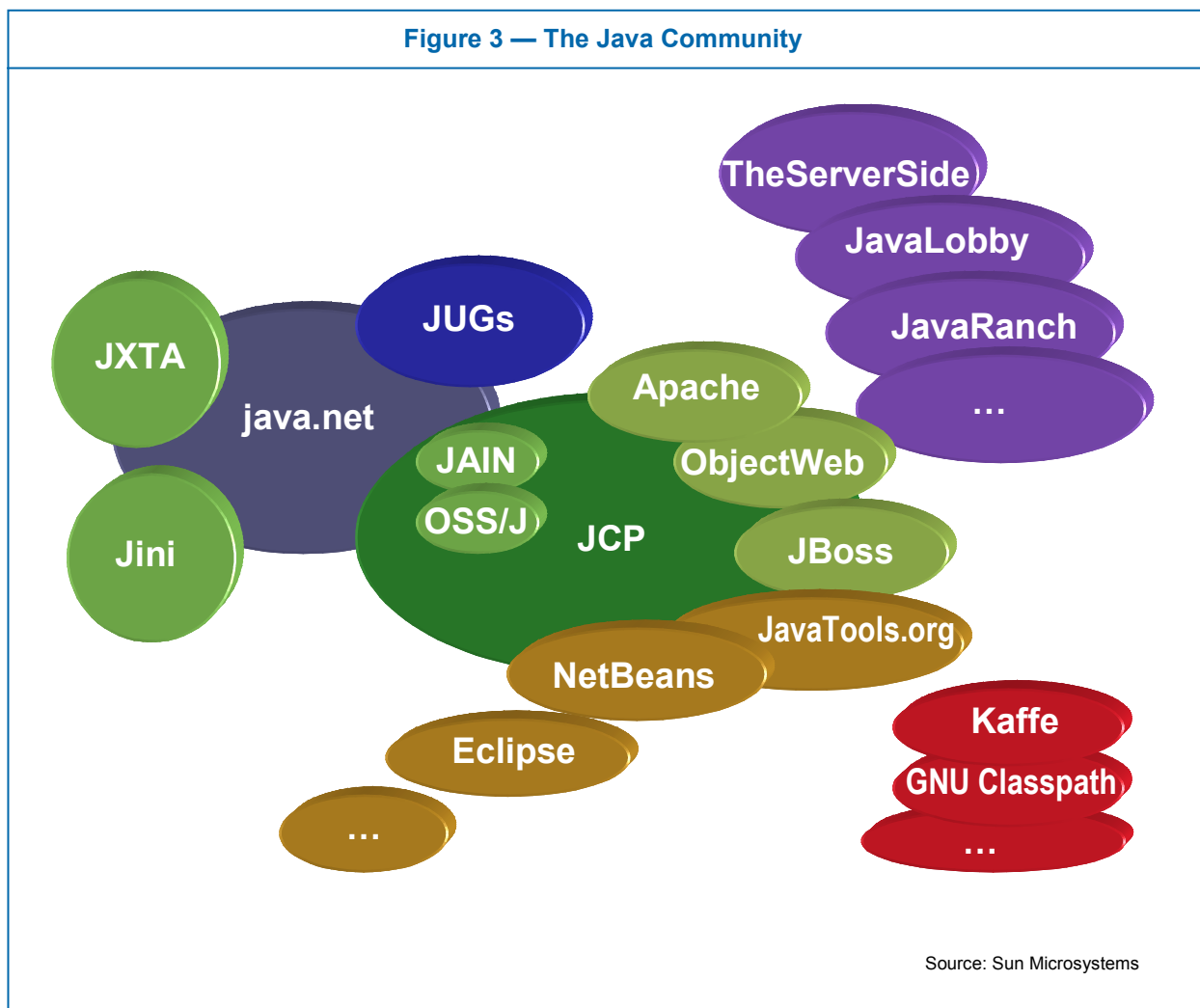
These various groups all influence the direction of Java technology through discussion and research and by producing software. However, it is critical that these efforts ultimately feed back into the JCP program to maintain standardization. This ensures that the platform implementation continues to provide the common, stable set of functions required to drive a vibrant ISV community and also provides end users with more choices. End users greatly benefit from Java technology standards just as ISVs do.

Compatibility enables end users to use products from large and small vendors without fear of lock-in or significant switching costs if the vendor's market position changes. This also helps the open source community play on a level field with commercial vendors. Therefore, although the larger community outside of the JCP program provides a broad field of discourse and enables new ideas to be tested and discussed before moving into a formal process, the end state of any technology designed for broad commercial use should be achieved through driving the technology into the JCP program. It is this combination of standards and communities that provides a vital balance and vibrant ecosystem.

A Customer Perspective

360Commerce started life as a professional services firm, but as Java matured, it opened the option for the company to start building products, and in 1997, 360Commerce developed a line of software targeting large retailers. Platform independence provided business feasibility and the object-oriented development approach enabled developers to quickly create solutions. Use of Java allows solutions to support Windows, Linux, and IBM cash register clients as well as multiple server tier platforms. Solutions are created with a single code base that is tested on multiple environments. 360Commerce finds that Java enables it to keep cost down and allows its customers to make OS/hardware choices later in the game. This provides a value to customers (and a bargaining chip) that lets them save on hardware, often covering the cost of the software.

The applications use a combination of J2EE back ends and J2SE clients for registers and JSP browser-based applications for the back office. Ease of use is critical for retail applications, and this is achieved with Swing-based GUIs. The applications are supported on IBM, BEA, and JBoss, and they are beginning work with Oracle. Code portability has been achieved in compatible implementations, but building portable deployment packages across the various distributions is still a challenge. Compatibility also enables the company's developers to use various tools for development.

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Although 360Commerce currently pays attention to the JCP, it does not take an active role. However, the company is considering increased participation, since it believes some areas are not being given enough attention. META Group believes that end-user involvement in the Java technology standards process is critical to healthy evolution of the standard, since end users stay focused on problems that are real and do not have the same agenda that vendors bring to the process. 360Commerce is very active in standards for its retail domain area, and community is important to it, which is a significant aspect of the standards.

The company wants to see the entire Java community involved rather than there being a fragmented approach, with creation of additional "standards" or overlap. For instance, it would like to see persistence handled in a consistent standardized manner. Although 360Commerce sees open source as having a role in Java technology, it is not always the appropriate solution due to licensing issues (legal constraints). The company currently views open source as an excellent approach for areas where utility exists and standards are in place, such as the bottom of the stack (e.g., HTTP, TCP/IP) where everything should work the same. The bottom line is that standards allow the company to focus on the business problems, rather than on how to do it a "better way."

Standards and compliance suites have created a foundation of interoperability and compatibility for vendors and end users to rely on in the Java technology market. Any time this foundation has not been stable, the value proposition has suffered, damaging overall return on investment. This has also created challenges for developers, who must take care to not use non-standard elements or accept vendor lock-in. This weakens the overall value proposition and strengthens the hand of Microsoft. Java is founded on choice — choice of operating systems and hardware and choice of vendor implementation — and these choices are founded on compatibility and interoperability.

Bottom Line

For Java technology to deliver maximum impact to the industry, it must balance the speed of innovation with the drive for standards and compatibility. This is best accomplished through a combination of a robust community, the Java Community Process program, and compatibility tests. End users should join and participate in the JCP and drive vendors to support standards to protect their software investments.

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