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2025

STATE OF JAVA

SURVEY & REPORT

A SURVEY OF OVER 2,000 JAVA PROFESSIONALS
FROM THE ONLY COMPANY 100% FOCUSED ON JAVA

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INTRODUCTION

THE AUTHORITATIVE JAVA STUDY CONDUCTED BY THE ONLY VENDOR 100% FOCUSED ON JAVA

Java turns 30 years old in 2025, a historic milestone for any programming language. But don't mistake its legacy for complacency — Java continues to innovate, adapt, and lead in the ever-evolving world of software development. In fact, in 2024 alone, Java saw many advancements, both in the language and its ecosystem. Some highlights include:

- Performance and Scalability – Features such as virtual threads and structured concurrency from Java 21 enable developers to write high-performance, concurrent applications more efficiently.
- Focus on Developer Productivity – Improvements in Java tooling, such as enhanced Visual Studio Code integration, provide developers with more accessible and efficient workloads.
- Resilience and Security – Java's emphasis on quantum-safe encryption prepares it for future cryptographic challenges.
- AI, Machine Learning and Cloud – Java's robust libraries and frameworks position it as a key platform for AI/ML development. Its integration with cloud-native platforms such as AWS and Google Cloud enhances its usability for modern distributed applications.

Java's ongoing evolution ensures it remains a relevant, powerful language and platform for a wide variety of use cases, from enterprise applications to digital transformation to cutting-edge AI/ML solutions.

To truly understand how Java's influence continues to shape the industry, we turn to the insights of its global user community. With over 2,000 survey participants from around the world, Azul's 2025 State of Java Survey and Report provides a comprehensive snapshot of the trends, challenges, and opportunities driving Java's impact in enterprise environments.

This report delves into how Java is shaping key areas of enterprise technology. It highlights Java's role in optimizing application and cloud performance, streamlining DevOps workflows, and enabling the development of AI-powered and AI-driven solutions. This year's findings underscore how Java remains a critical foundation for both legacy systems and emerging technologies, bridging the gap between reliability and innovation. It also explores the factors driving businesses to migrate away from Oracle Java and seek alternatives based on OpenJDK.

By capturing the voices of Java practitioners, Azul's 2025 State of Java Survey and Report offers a definitive resource that not only reflects Java's current state but also illuminates its future trajectory — proving that even as Java celebrates three decades, its best years are still ahead.

KEY FINDINGS

JAVA'S CONTINUING INFLUENCE IN THE ENTERPRISE

99%
USE JAVA IN SOFTWARE OR INFRASTRUCTURE

85%
PAY FOR JAVA COMMERCIAL SUPPORT

49%
USE JAVA 17 OR JAVA 21

ORACLE JAVA MIGRATION

82%
ARE CONCERNED ABOUT ORACLE JAVA PRICING

88%
ARE CONSIDERING SWITCHING FROM ORACLE TO ANOTHER JAVA PROVIDER

JAVA AND AI

50%
BUILD AI FUNCTIONALITY WITH JAVA

72%
MUST INCREASE COMPUTE CONSUMPTION TO SUPPORT AI

JAVA AND DEVOPS PRODUCTIVITY

62%
SAY DEAD OR UNUSED CODE AFFECTS DEVOPS PRODUCTIVITY

49%
ARE STILL IMPACTED BY LOG4J

65%
SAY JAVA WORKLOADS ARE MORE THAN HALF THEIR CLOUD COMPUTE BILLS

JAVA'S ROLE IN THE CLOUD

71%
HAVE MORE THAN 20% UNUSED CLOUD COMPUTE CAPACITY

24%
USE A HIGH-PERFORMANCE JDK

33%
SAY SECURITY FALSE POSITIVES WASTE MORE THAN 50% OF DEVOPS' TIME

KEY AREAS **OF FOCUS**

JAVA'S CONTINUING INFLUENCE IN THE ENTERPRISE

Java continues to solidify its position as a cornerstone of enterprise technology, with its widespread adoption reflected in the survey data. Remarkably, only 1% of potential participants across the globe were excluded from participating in Azul's survey due to not using Java — a testament to the language's ubiquity in modern development environments. In addition, nearly 70% of respondents said that at least 50% of their applications are either built with Java or run on a Java Virtual Machine (JVM).

ORACLE JAVA MIGRATION

Concerns over Oracle Java's pricing remain a significant pain point for many enterprises. Two years after Oracle's controversial pricing increase, 82% of Oracle Java users continue to express unease over its cost structure – the exact same percentage of users who expressed concern when Oracle made their latest pricing change in 2023. In addition, the percentage of Oracle Java users considering switching to another JVM/JDK such as those based on OpenJDK has climbed sharply — from 72% in 2023 to 88% today. This trend underscores a growing willingness among organizations to explore alternative Java solutions that offer both cost efficiency and pricing certainty, further signaling dissatisfaction with Oracle's pricing strategy.

JAVA'S ROLE IN THE CLOUD

As organizations continue to adopt and procure public cloud services, over half of that capacity is being allocated to Java – nearly two-thirds of organizations that use Java workloads in the cloud say more than 50% of their cloud compute costs are from Java workloads. However, companies are struggling to find ways to align what they procure to what they are actually using; 71% of survey respondents say that more than 20% of their cloud compute capacity is unused.

KEY AREAS **OF FOCUS**

JAVA AND DEVOPS PRODUCTIVITY

Faster development cycles are a competitive advantage. But in an economic climate where cost savings are critical, companies are investing an immense number of cycles maintaining and fixing unused or dead code, hampering their ability to focus on development that supports their organizations' growth. In fact, 62% of survey participants say that dead or unused code affects DevOps productivity. In addition, 33% of participants say that more than 50% of their DevOps teams' time is wasted on Java-related security vulnerability false positives. This inefficiency not only drains productivity but also prevents DevOps teams from prioritizing critical tasks like driving innovation and ensuring system resilience — key components for sustaining organizational growth and staying competitive.

JAVA AND AI

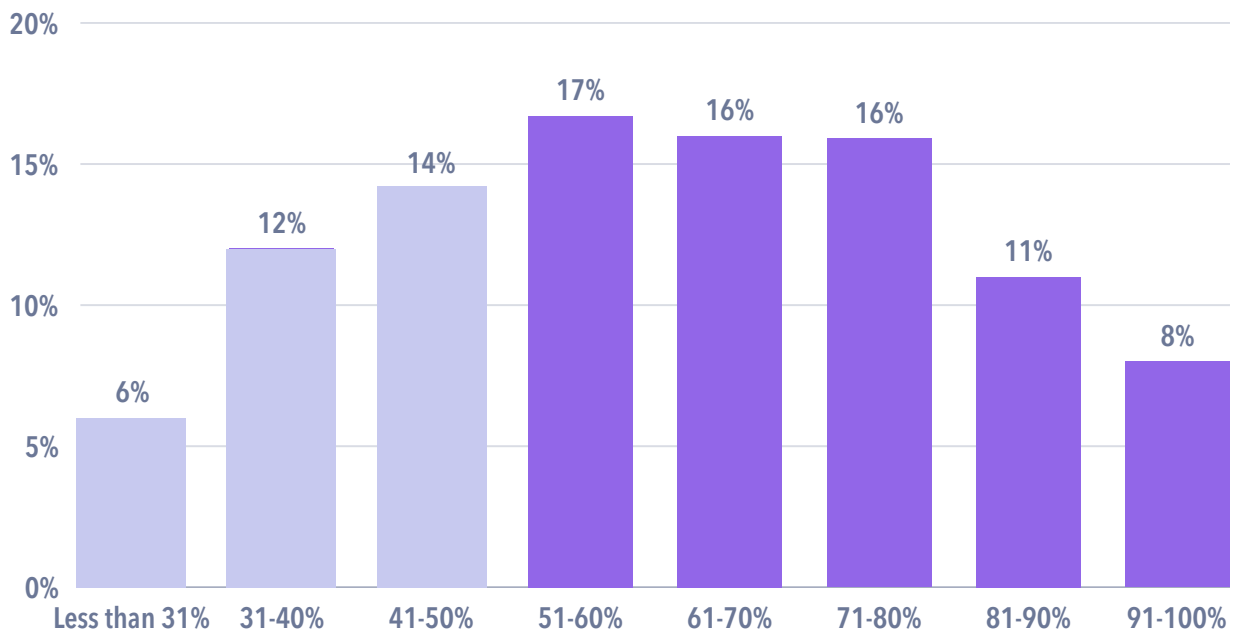
Java developers are actively leveraging AI to drive innovation, enhance application functionality, and deliver significant business value. 50% of survey participants who build AI functionality use Java, surpassing the use of other popular languages like Python that are more culturally associated with AI. This highlights Java's "fit-for-purpose" nature in AI, offering scalability, extensive libraries, and seamless integration with existing enterprise systems.

JAVA'S CONTINUING INFLUENCE IN THE ENTERPRISE

Java remains influential and in demand as a cornerstone for enterprises. Only 1% of those contacted were disqualified from taking the survey because they don't use Java. Furthermore, nearly 70% of respondents say that more than half of their applications are built with Java or run on a JVM [Figure 1], underscoring Java's role as a foundation for both legacy systems and modern, scalable architectures. These numbers reaffirm Java's importance not just as a programming language, but as a critical enabler of enterprise innovation and long-term technological stability.

68%

OF RESPONDENTS REPORT THAT MORE THAN 50% OF THEIR APPLICATIONS ARE BUILT WITH JAVA OR RUN ON A JVM



TO THE BEST OF YOUR KNOWLEDGE, WHAT PERCENT OF YOUR ORGANIZATION'S APPLICATIONS ARE BUILT WITH JAVA OR RUN ON A JAVA VIRTUAL MACHINE (JVM)? PLEASE CONSIDER IN-HOUSE DEVELOPED SOFTWARE AS WELL AS 3RD PARTY SOFTWARE

Figure 1 - 68% of survey participants say more than 50% of their applications are built with Java or run on a JVM.

One of Java's key differentiators compared to other programming languages is its strong backward compatibility across versions. Most applications compiled using a specific JDK version will continue to run, without needing changes to code or recompilation on newer versions. In older versions of Java, there have been some issues with APIs outside of the core class libraries (e.g. migrating from Java 8 to Java 11 or 17). However, for organizations considering upgrades, the process is notably smoother when transitioning from a recent Long-Term Support (LTS) version, such as Java 17, to the latest LTS version Java 21. This has been encouraging for organizations that want to have a more regular upgrade cycle.

This trend is reflected in the survey results. Java 21 emerged as the second most popular version among respondents, surpassed only by Java 17, highlighting the strong adoption and appeal of newer LTS releases within the Java ecosystem [Figure 2].

Oracle ended free support for Java 17 for commercial use in September 2024. When this survey was being conducted in the fall of 2024, Java 17 users were in the midst of deciding whether they were going to pay Oracle, upgrade to Java 21, or switch to another JDK provider. Given they would be subject to the employee-based pricing model, the Java 17 deadline caused much consternation, which may explain why Java 17 use dropped from 48% in 2023 to 34% this year.

In addition, 52% of participants use more than one version of Java, down from 64% in 2023, which is likely due to companies consolidating on newer releases.

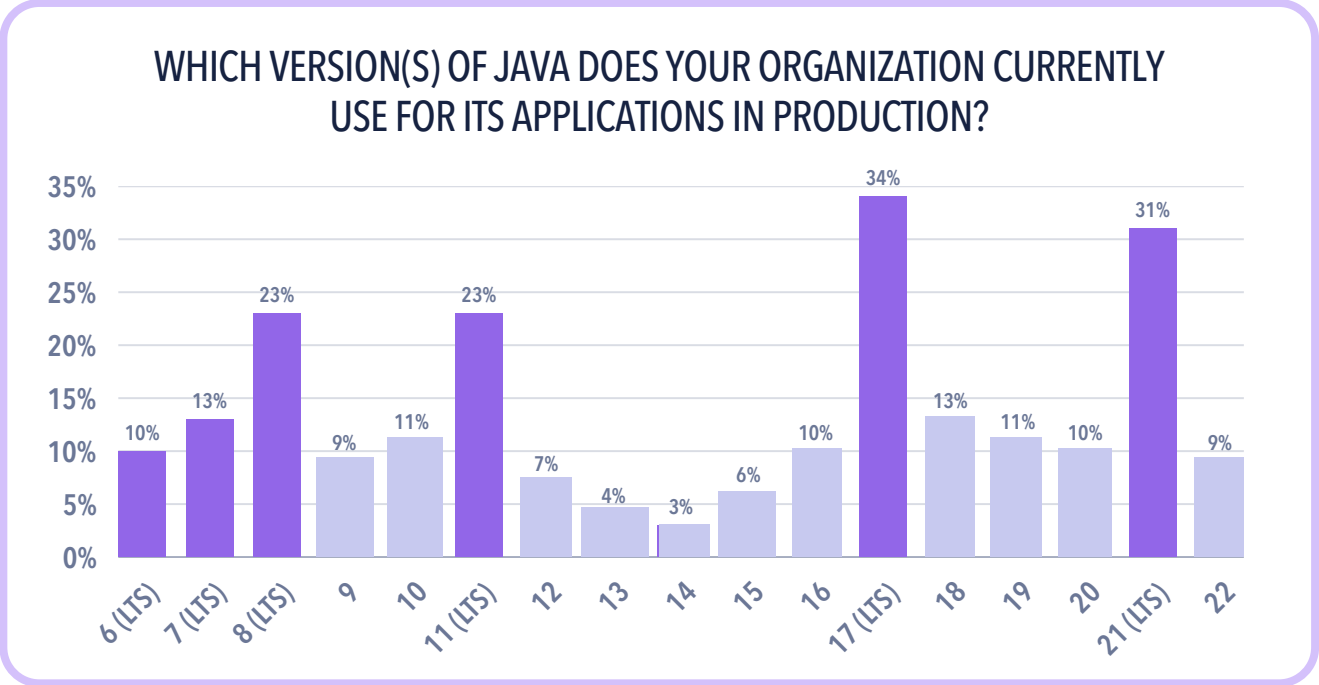


Figure 2 - Java 21 is the second most popular Java version among survey participants. LTS versions in purple.

NEARLY ALL JAVA-BASED COMPANIES PAY FOR JAVA SUPPORT

When it comes to running applications on older versions of Java, functionality might not be an issue — but support is a different story. While older Java versions can often be reliable, they lack free commercial support, leaving organizations exposed to risks like unresolved security vulnerabilities or unaddressed performance issues. The question then arises: is paying for commercial Java support worth it? According to the survey, a resounding 85% of participants think so, marking a notable increase from 66% in 2023 [Figure 3].

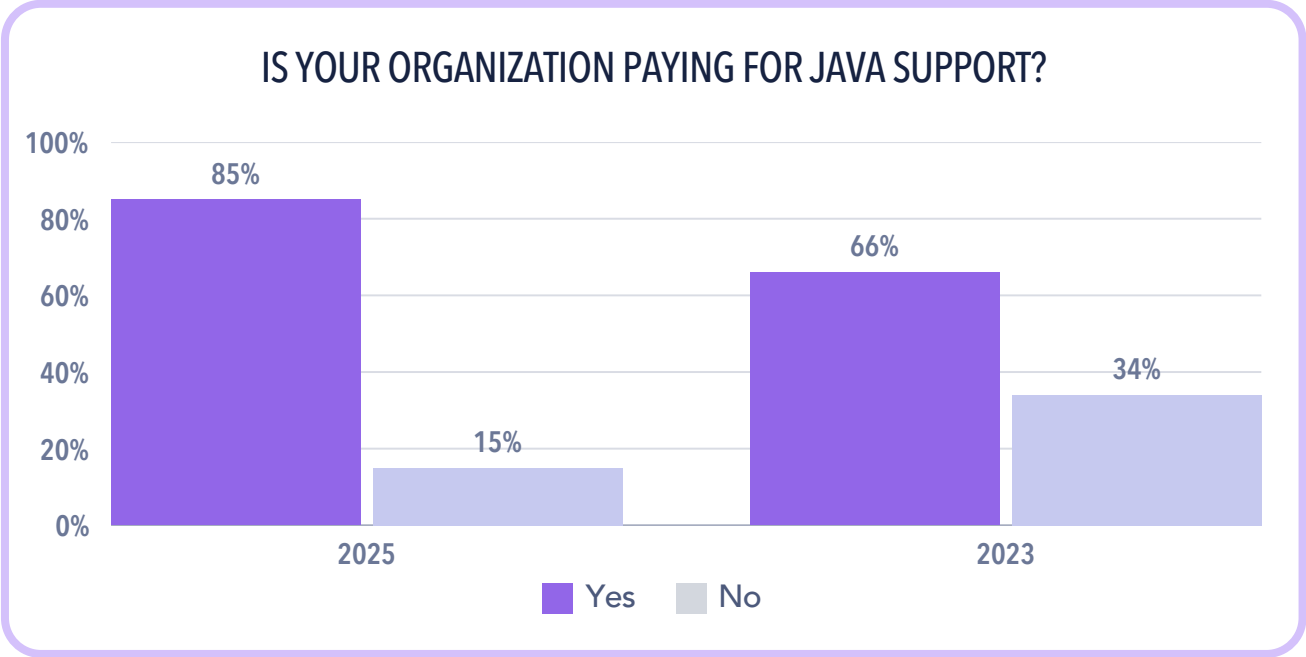


Figure 3 - 85% of survey participants pay for Java commercial support.

Applications operate in a chaotic, unpredictable world, and commercial Java support serves as a critical safeguard against these challenges. Paid support provides essential services such as patches, bug fixes, updates to address known vulnerabilities, and expert assistance to mitigate risks. For example, only Oracle's and Azul's commercial Java support includes access to Critical Patch Updates (CPUs), which are a much smaller subset of vulnerability patches and reduce a company's reliance on larger Patch Set Updates (PSUs) which include bug fixes and other non-critical code changes. Likewise, on several occasions PSUs have introduced new regressions to Java, requiring a re-issue of the update which has typically taken two to five weeks to resolve. Additionally, commercially supported versions of Java include indemnification protection for organizations. Azul's commercial support goes a step further as the only distribution which offers security updates and bug fixes for legacy Java versions like Java 6 and 7, which allows users to continue running applications on these platforms while maintaining the maximum level of security and stability.

However, cost remains a growing barrier for some organizations. Among survey participants who don't pay for Java support, 21% cite expense as a deterrent, 31% say it isn't a priority, and a significant 52% believe they simply don't need it [Figure 4]. This divide highlights the trade-offs organizations face between upfront costs and the long-term value of secure, reliable application performance — particularly in environments where stability and security are non-negotiable.

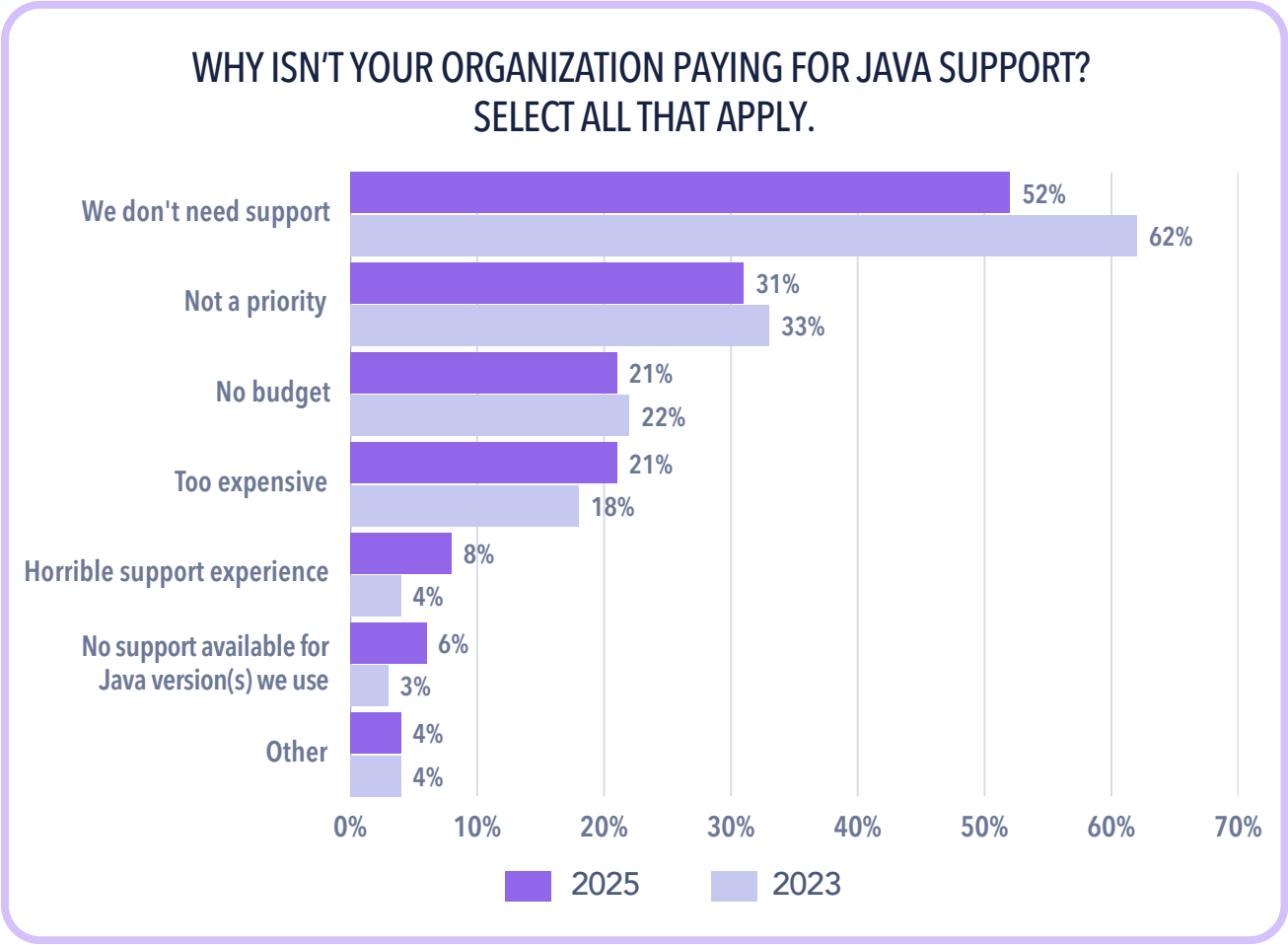


Figure 4 – 52% of participants say that they don't need commercial Java support.

POPULAR JAVA-BASED INFRASTRUCTURES, LANGUAGES, AND FRAMEWORKS

In this survey, Spark has overtaken Kafka as the top Java-based infrastructure [Figure 5]. Spark offers speed and versatility for data analysis, machine learning, and streaming data processing.

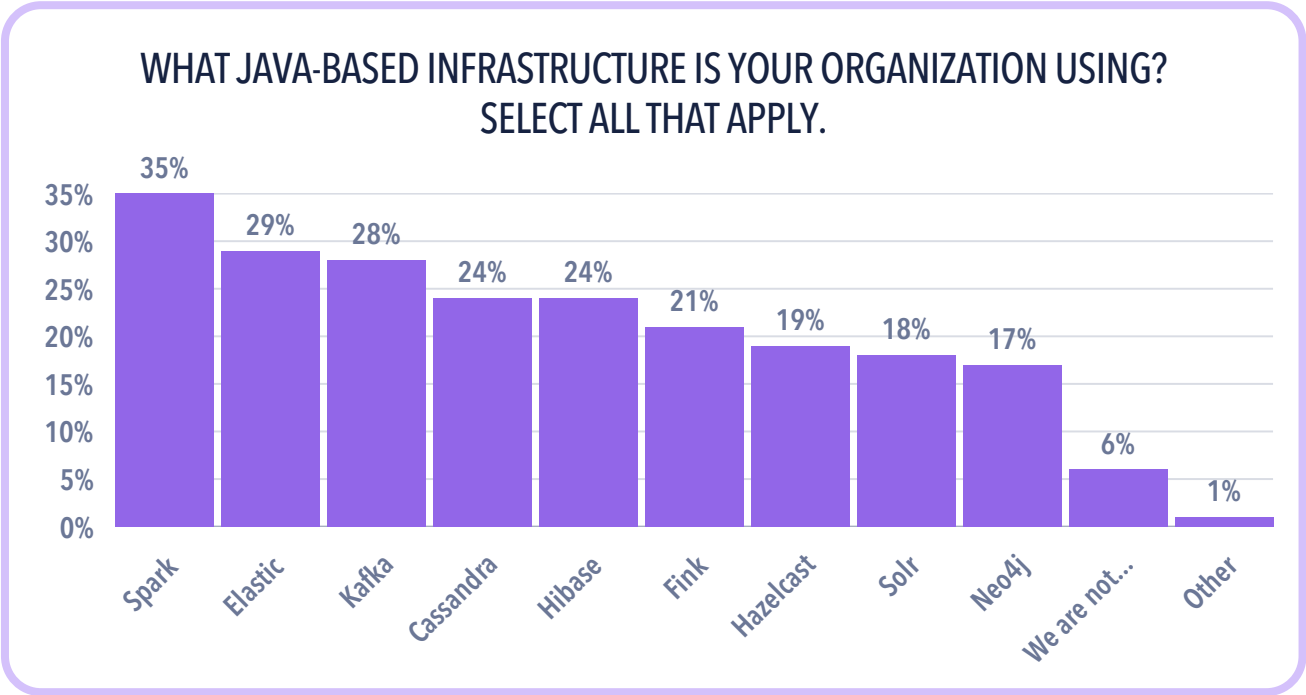


Figure 5 - Spark has overtaken Kafka as the top Java-based architecture.

Groovy is the most popular Java-based language in this survey, overtaking Kotlin and Scala [Figure 6]. Groovy's concise, flexible syntax is similar to Java's, and developers can easily integrate Groovy code with existing Java applications while enjoying its dynamic features.

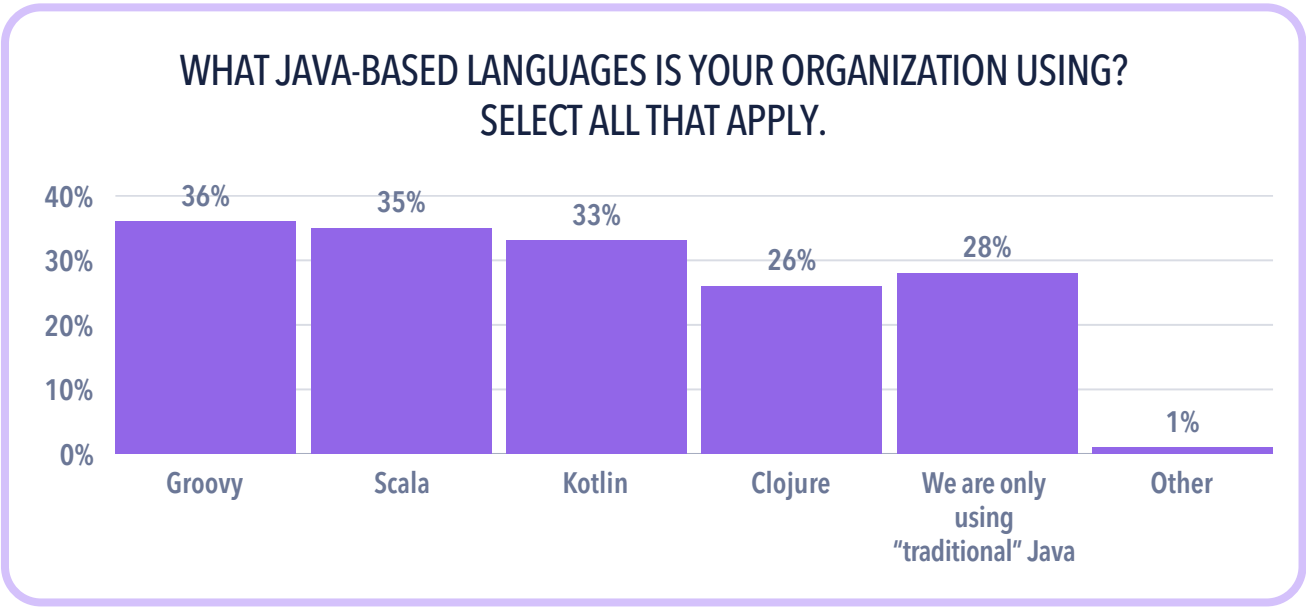


Figure 6 - Groovy has overtaken Kotlin and Scala as the most popular Java-based language

Spring Boot is still the most popular microservices-based framework, as it was in 2023 [Figure 7]. Spring Boot simplifies development with features like automatic configuration and dependency management.

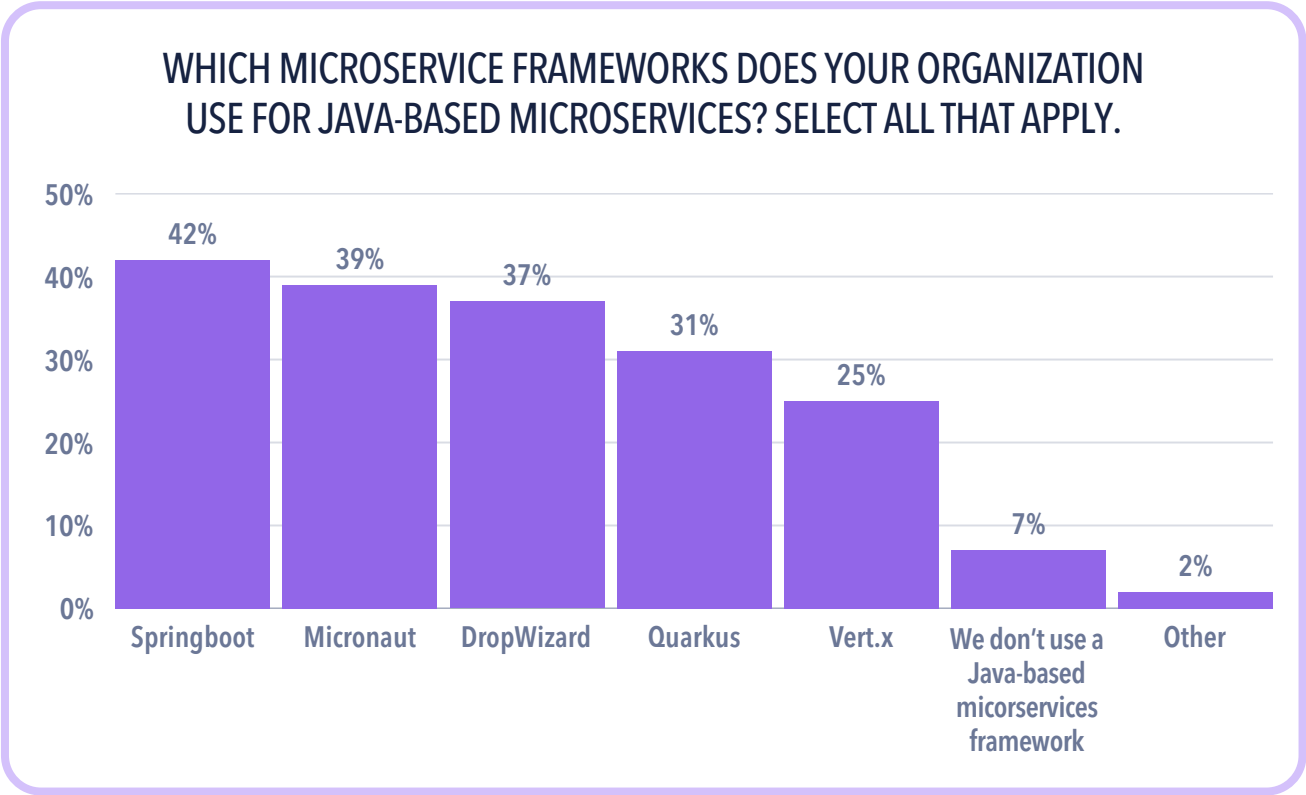


Figure 7 - Spring Boot is still the most popular microservices-based framework.

ORACLE JAVA MIGRATION

Concerns over Oracle Java's pricing remain a persistent and growing challenge for enterprises. Two years after Oracle's shift to an employee-based pricing model in January 2023, 82% of Oracle Java users continue to express concern over its cost structure [Figure 8] — a figure unchanged since the sentiment reported in the immediate aftermath of the announcement in Azul's 2023 survey. In addition, while 72% of Oracle Java users were already considering a switch to another OpenJDK provider in 2023, that figure has surged to 88% in 2024 [Figure 10]. This growing dissatisfaction reflects a pressing need for cost-effective alternatives that align with tight IT budgets. Oracle's pricing model has not only fueled concerns about affordability but also spurred organizations to re-examine their long-term strategies for managing Java licensing and support costs, driving a search for more predictable and sustainable options.

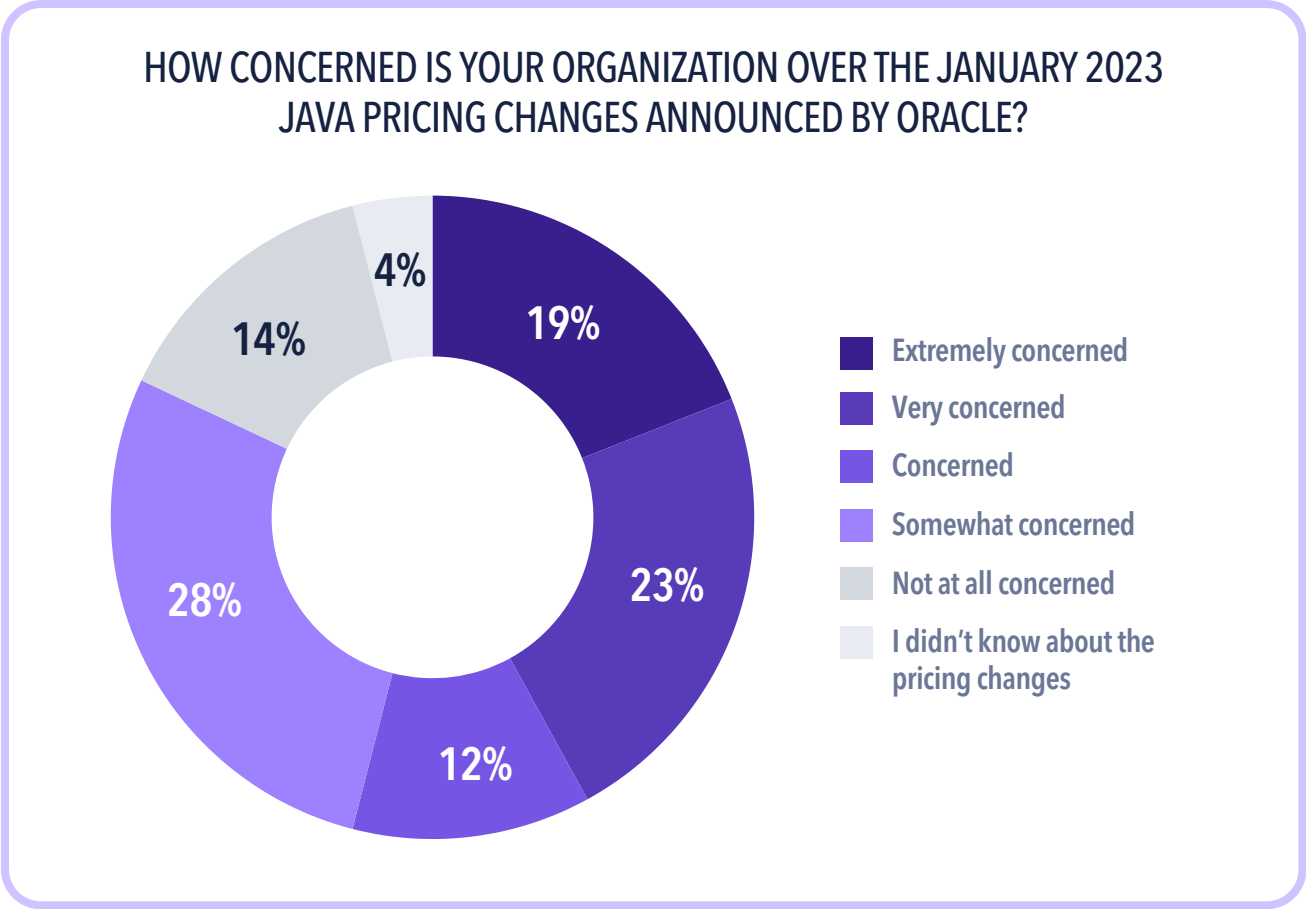


Figure 8 - 82% of organizations are concerned about Oracle Java pricing.

Oracle ended free commercial support for Java 17 in October 2024, and participants who were still using Oracle Java 17 at the time the survey was conducted were in the last days of free support. Those participants have either decided to pay Oracle for continued use and support, upgrade to Java 21, replace Java with another programming language, or migrate to another JDK distribution/provider. 55% of Oracle Java 17 users say they are very or extremely concerned, compared to 42% overall [Figure 9].

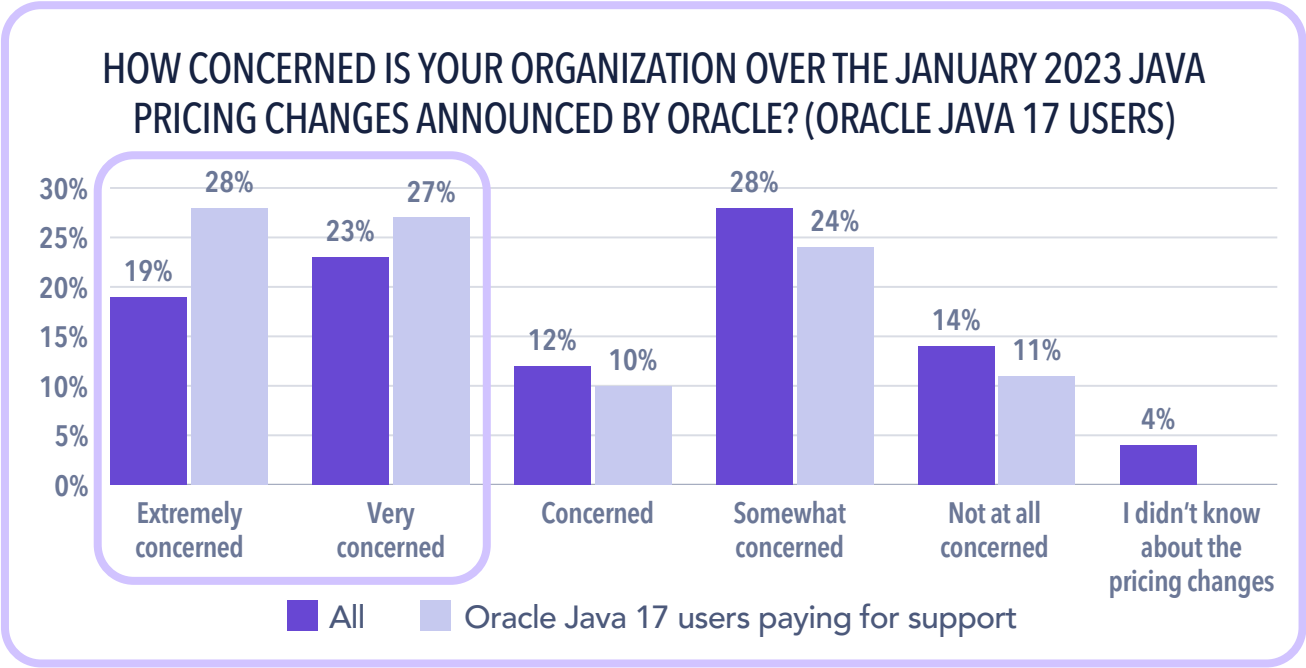


Figure 9 - 55% of Oracle Java 17 users are very or extremely concerned about Oracle Java pricing.

THE MIGRATION FROM ORACLE JAVA CONTINUES

A staggering 88% of companies using Oracle Java are now considering switching to another Java provider [Figure 10]. This represents a dramatic 22% increase over the 2023 survey results [Figure 11], signaling growing dissatisfaction with Oracle's pricing and licensing policies. Moreover, nearly half (46%) of these companies are opting to migrate to an OpenJDK release with paid support, highlighting a strong preference for cost-effective yet reliable solutions that meet their technical and business needs.

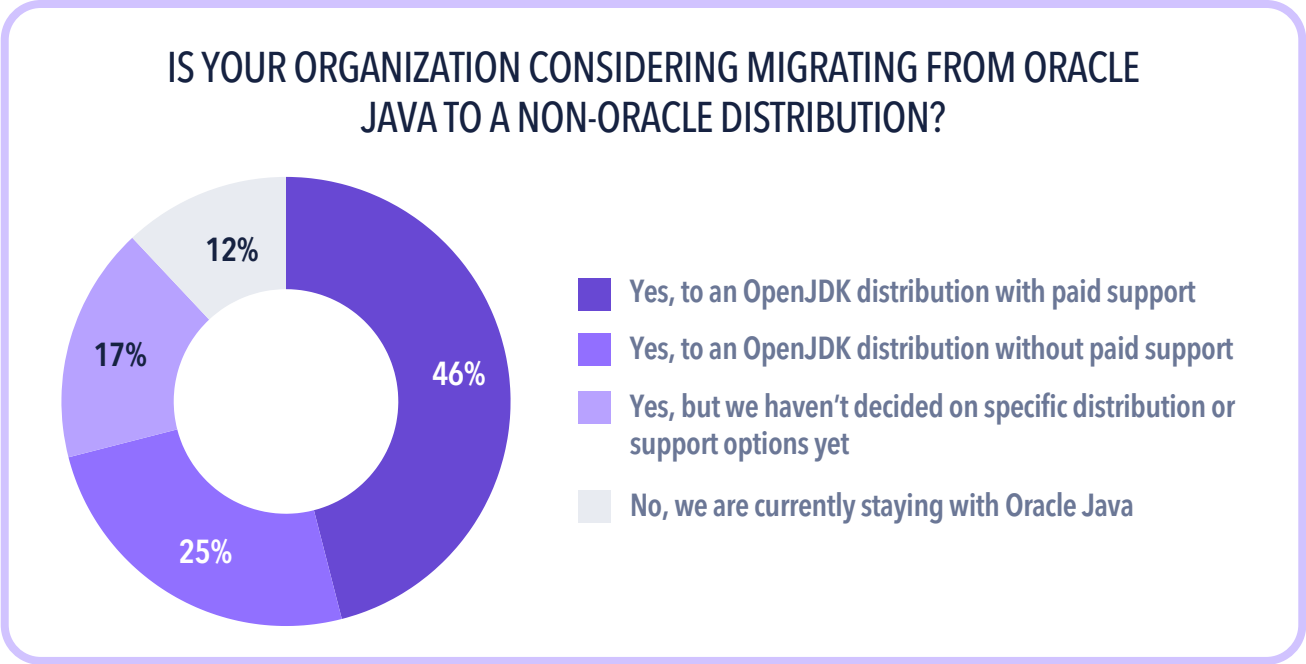


Figure 10 - 88% of companies that use Oracle Java are considering switching to another Java provider.

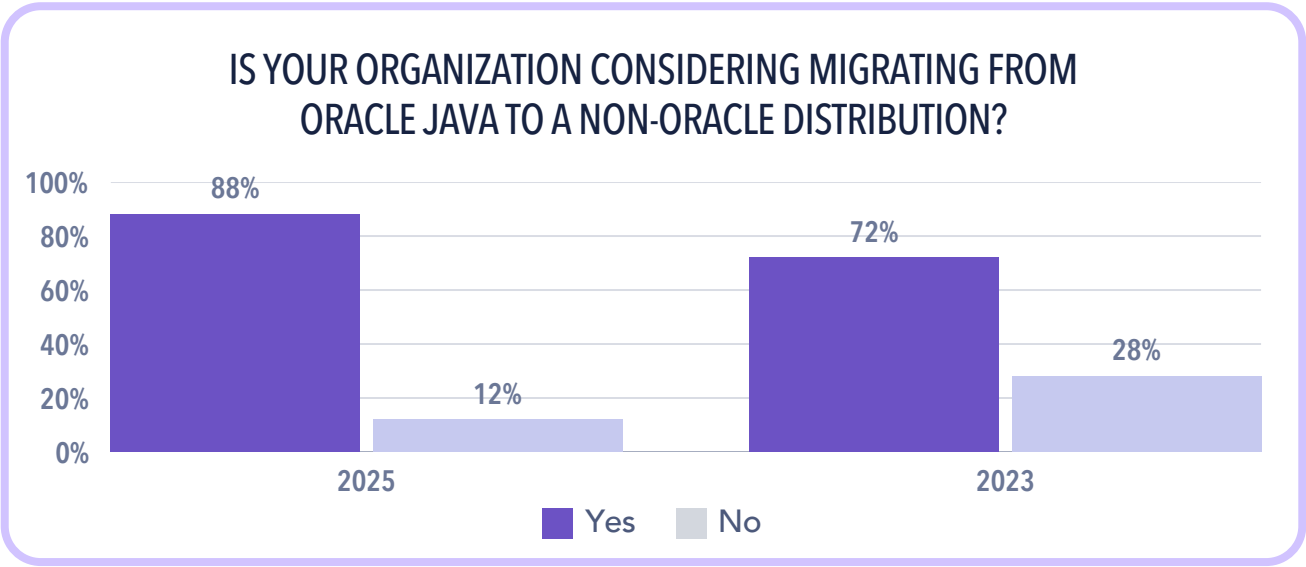


Figure 11 - More companies are considering switching to a non-Oracle Java provider in 2025 than in 2023.

When asked why they are considering switching to another Java provider, respondents voiced significant dissatisfaction with Oracle, citing a range of reasons. 42% say that Oracle is too expensive, 37% highlighted Oracle's sales tactics, and 36% pointed to uncertainty created by ongoing pricing and licensing changes. In addition, 40% of respondents note a preference for open-source solutions, emphasizing the appeal of community-driven innovation and flexibility [Figure 12]. Together, these factors paint a clear picture of growing dissatisfaction among Oracle Java users, fueling the search for alternatives.

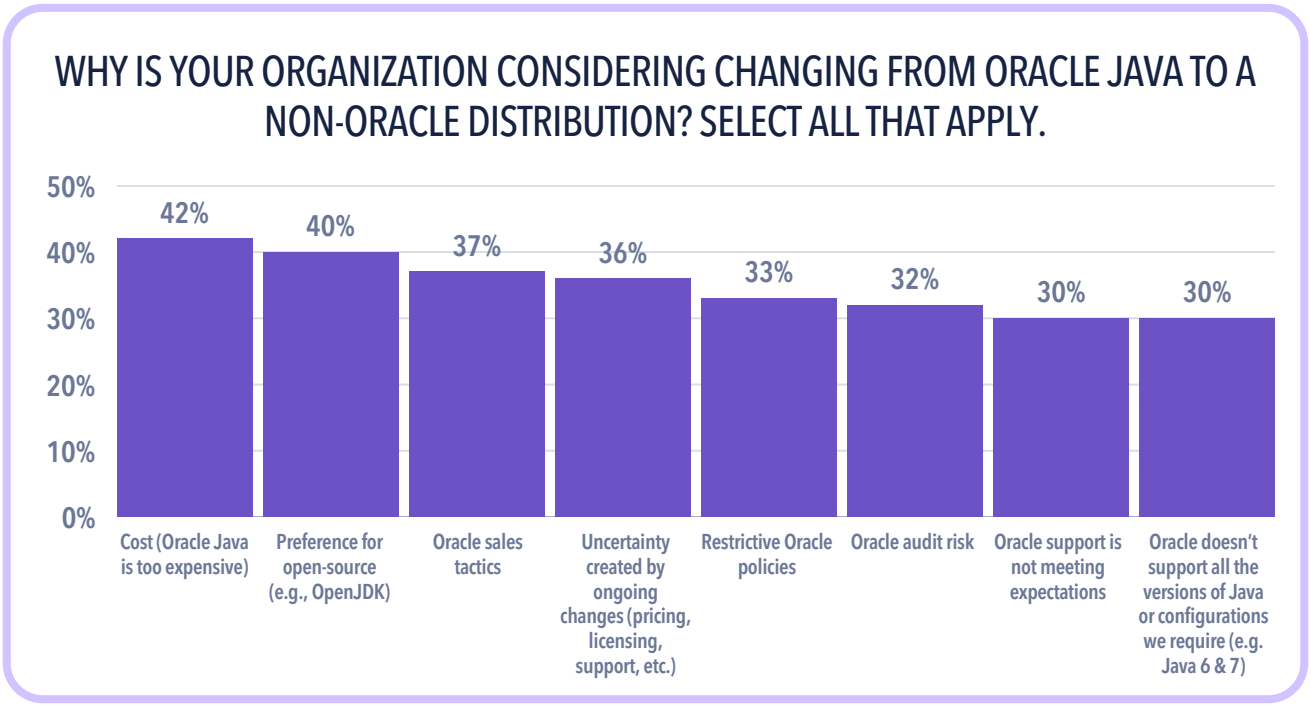


Figure 12 - Most participants say they are considering switching to another Java provider because of dissatisfaction with Oracle.

JAVA'S ROLE IN THE CLOUD

As organizations increasingly adopt public cloud services, a significant portion of that capacity — more than half — is dedicated to Java workloads. In fact, nearly two-thirds of organizations using Java in the cloud report that over 50% of their cloud compute costs stem from Java. Optimizing Java in the cloud presents a substantial opportunity to reduce costs without compromising performance [Figure 13].

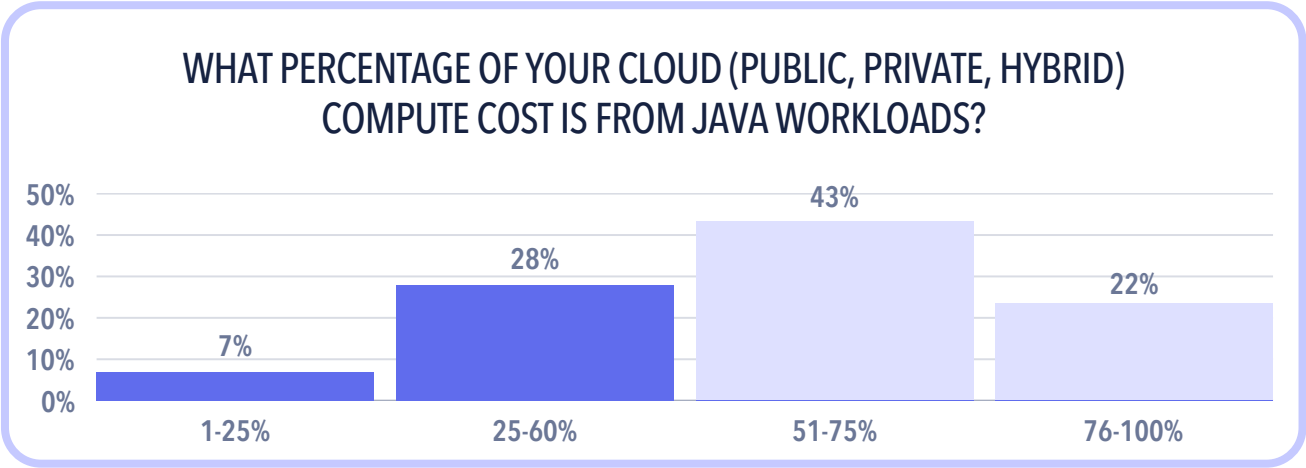


Figure 13 - 65% say more than half their cloud compute cost is from Java workloads. There is tremendous opportunity for reducing cloud bills by optimizing Java compute workloads in the cloud.

COMPANIES CONTINUE TO OVERPROVISION CLOUD RESOURCES

Many organizations are overpaying for cloud resources due to significant underutilization of their compute capacity. The survey reveals that 71% of respondents have more than 20% of their cloud compute capacity sitting idle [Figure 14]. This widespread overprovisioning highlights a costly disconnect between the resources companies purchase and what they actually use. As cloud expenses climb, this inefficiency not only inflates operating costs but also diverts funds that could be invested in innovation or growth initiatives.

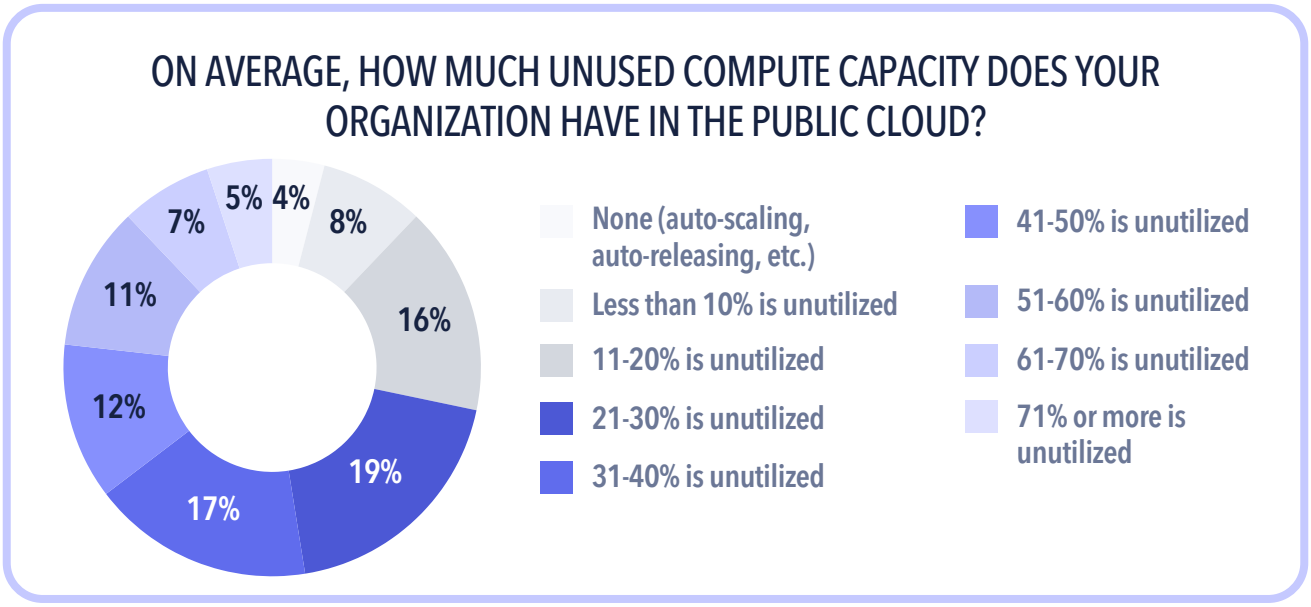


Figure 14 – 71% of organizations have more than 20% unutilized cloud compute capacity that they pay for.

Most survey respondents are taking proactive measures to prevent overspending on cloud services, implementing their own guardrails to manage expenses more effectively [Figure 15]. This shift reflects a growing awareness of the financial risks associated with unchecked cloud spending, particularly as cloud usage becomes increasingly integral to business operations. By taking steps to better align cloud investments with actual usage, organizations can not only control costs but also maximize the value they derive from their cloud environments, ensuring that spending supports innovation and operational efficiency rather than waste.

Over the last 12 months, 38% of survey participants say they have implemented new internal rules for using cloud instances, including 25% who say that they have already established a FinOps function. 35% of organizations are using newer, more efficient compute instances and processors, supporting the trend to use AWS Graviton and ARM processors for efficiency and speed. In addition, 24% of survey respondents use a high-performance JDK to enhance application performance, reduce costs, and boost efficiency. This highlights the growing recognition among organizations that investing in an optimized Java runtime can deliver significant operational and financial benefits.

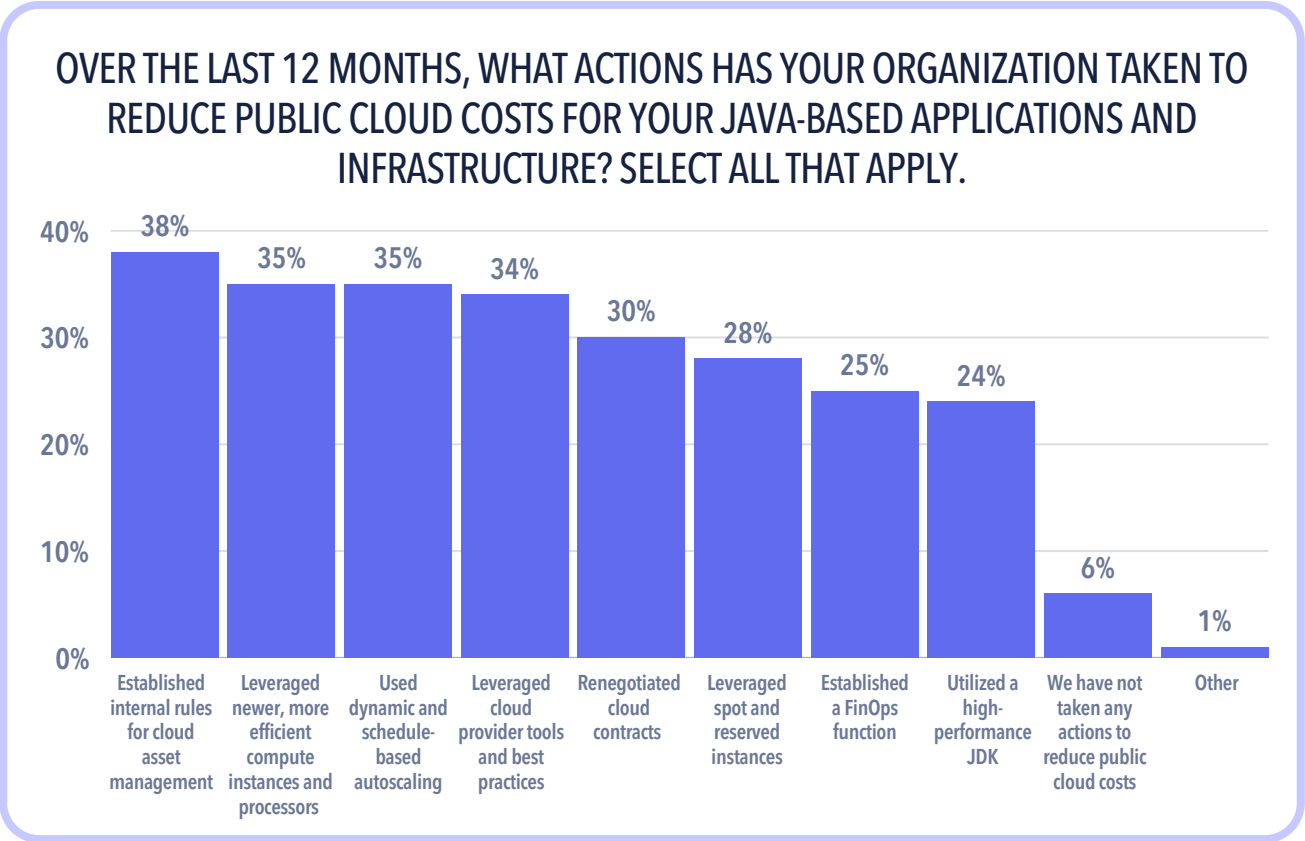


Figure 15 - Organizations are leveraging many different approaches to curb cloud spend, including utilizing a high-performance JDK.

Of those organizations who use a high-performing JDK, the top two reasons cited were to "improve application performance" and "optimize cloud compute costs." [Figure 16]

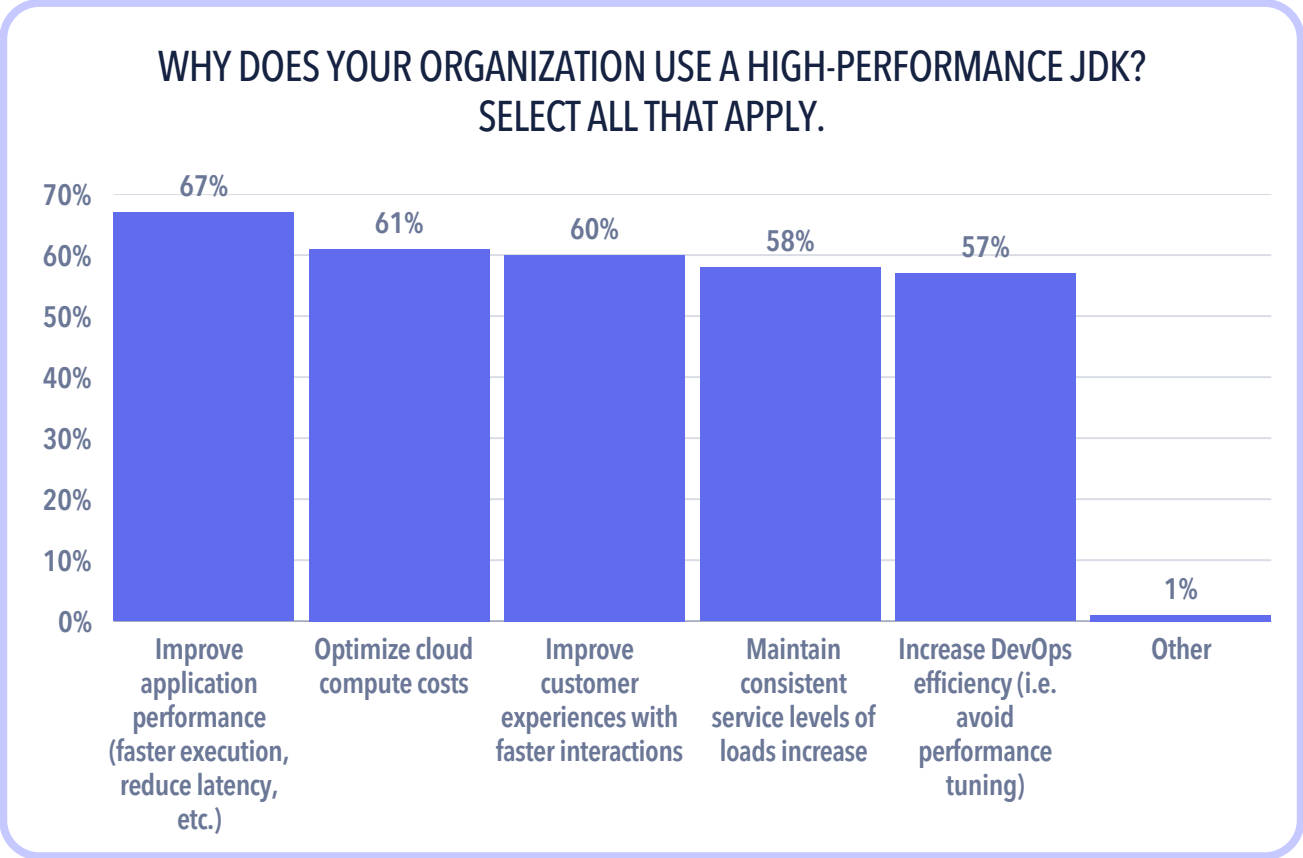


Figure 16 - Organizations who use a high-performance JDK cite many reasons why.

JAVA AND DEVOPS PRODUCTIVITY

Faster development cycles are essential for maintaining a competitive edge, but organizations face significant barriers that impact DevOps efficiency. Dead or unused code is a major challenge, with 62% of survey participants reporting it hampers their DevOps teams' effectiveness [Figure 17].

By leveraging technologies and processes to improve DevOps productivity, organizations can focus on driving innovation, growth, system resilience, customer experience, and ultimately company growth.

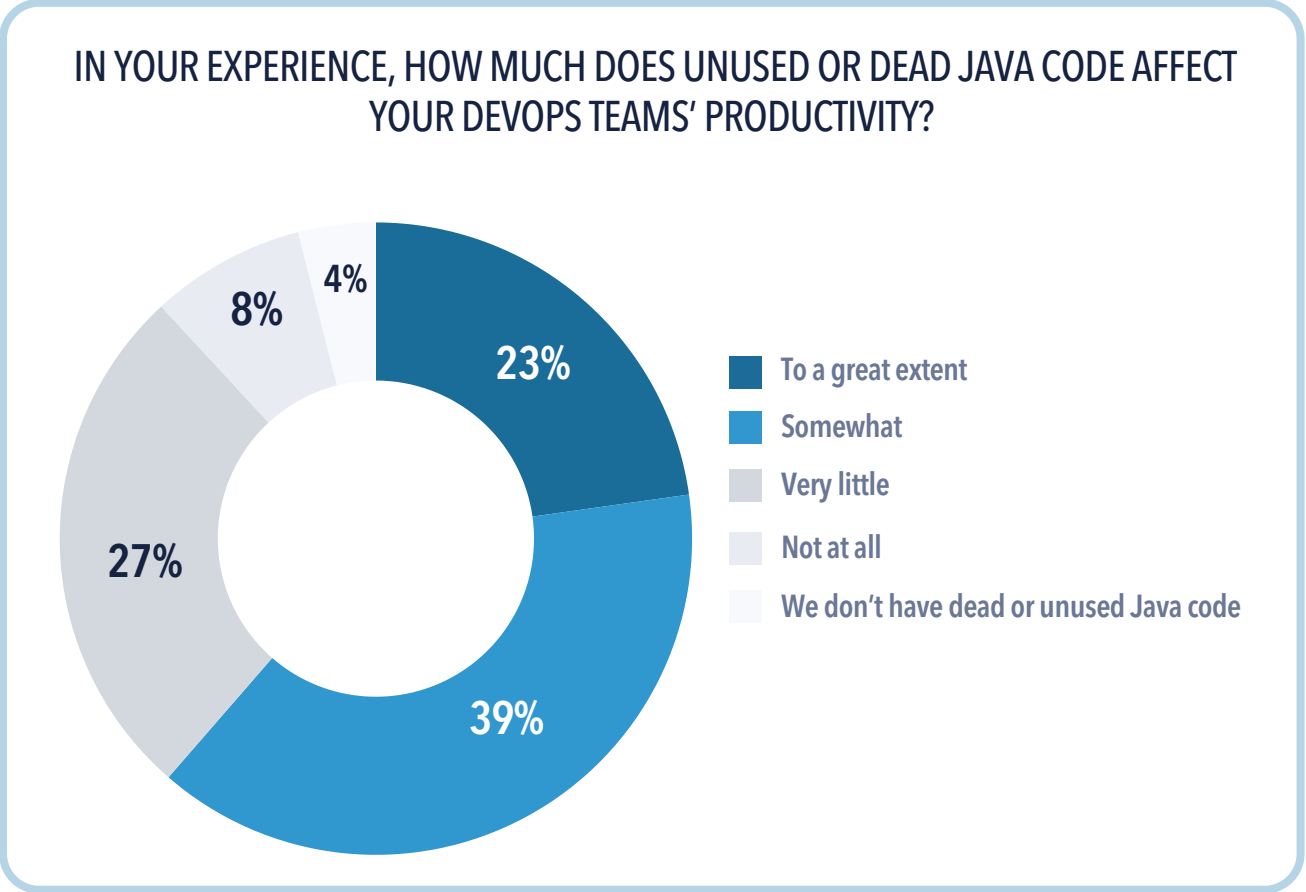


Figure 17 - 62% of participants say dead or unused code affects DevOps productivity somewhat or to a great extent.

SECURITY ISSUES IMPACT DEVOPS PRODUCTIVITY

Security also takes a toll on DevOps productivity. 33% of respondents say more than half of their DevOps teams' time is wasted addressing false positives from Java-related security vulnerabilities [Figure 18]. When DevOps can't separate the real vulnerabilities from the hypothetical ones, DevOps have fewer resources available for development and other priorities to help drive the business.

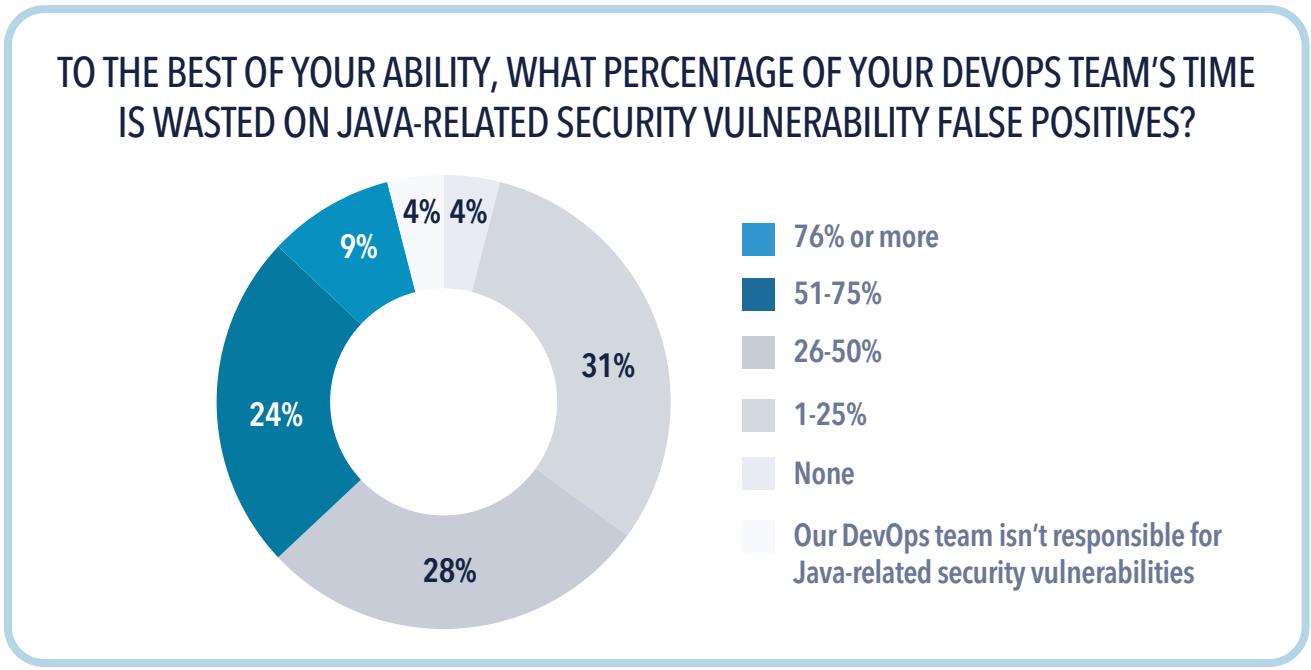


Figure 18 - False positives prevent efficient vulnerability triage.

Critical security issues are a significant concern for survey participants, with 41% reporting that they encounter critical production security issues within their Java ecosystem on a weekly or daily basis [Figure 19]. The high frequency of daily false positives can become overwhelming, leading to alert fatigue and reducing employees' attentiveness to genuine security threats.

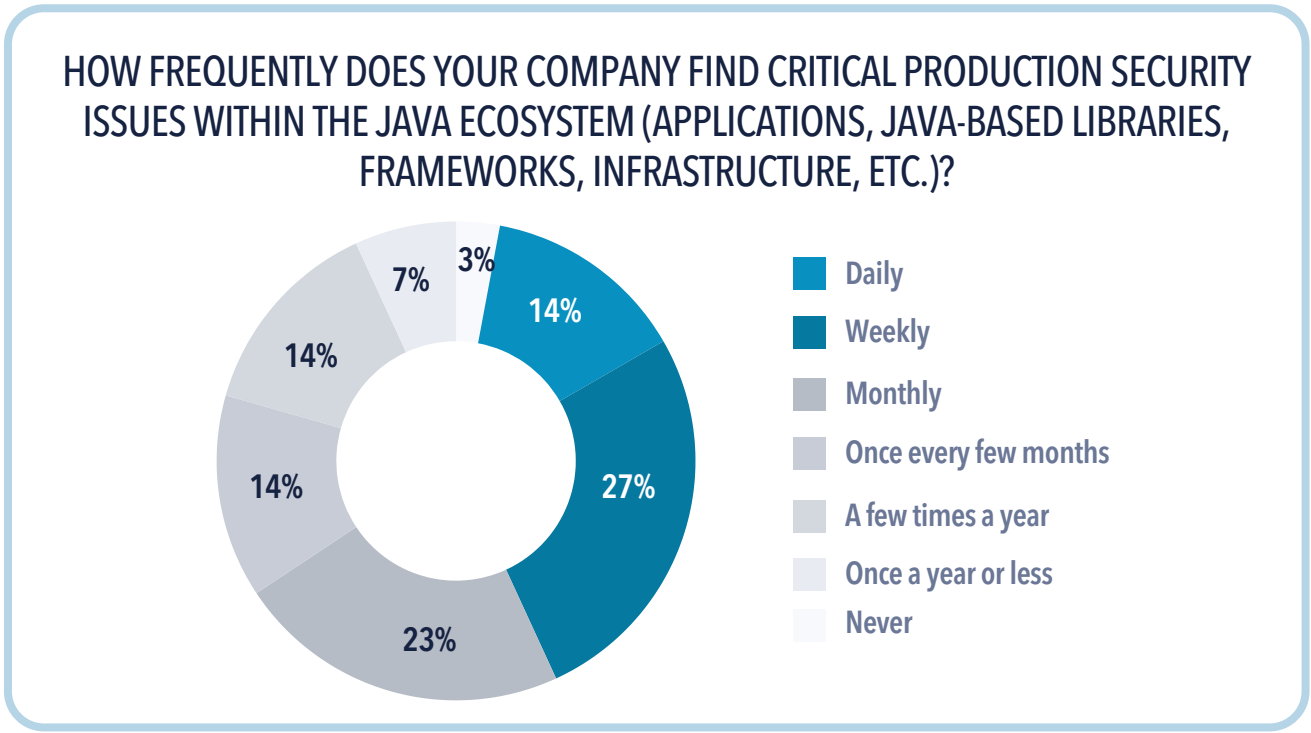


Figure 19 - Critical security issues still plague participants.

Log4Shell, a critical vulnerability in the Log4j Java library, was publicly disclosed in December 2021, along with a corresponding patch. However, organizations faced significant hurdles in addressing this issue — first in identifying the vulnerable versions of Log4j scattered throughout their Java applications and infrastructures, and then in ensuring those instances were consistently and effectively patched.

Three years later, almost half the companies in this survey are still experiencing security vulnerabilities from Log4j in production [Figure 20].

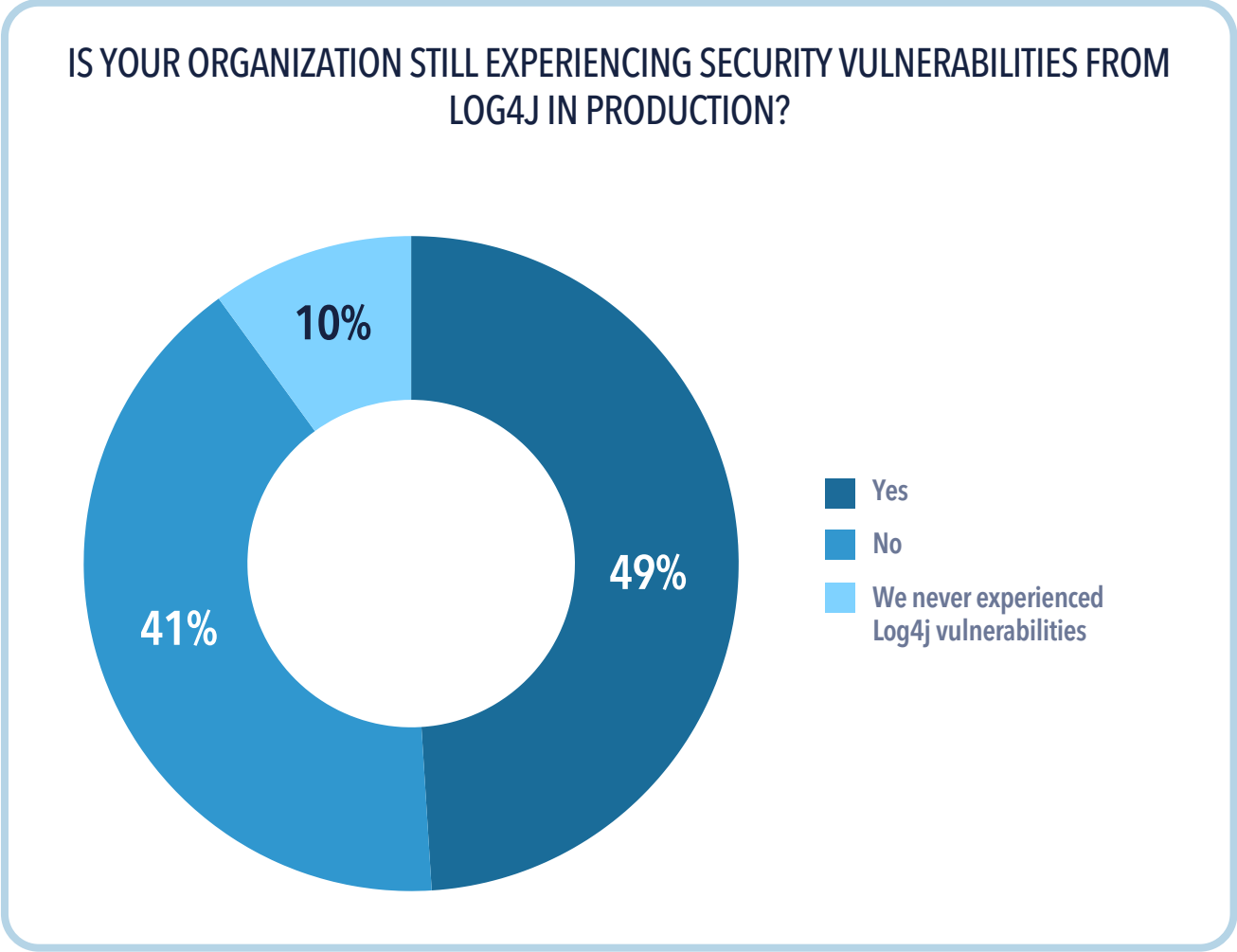


Figure 20 - 49% of the companies in this survey are still experiencing security vulnerabilities from Log4j in production.

JAVA AND AI

Java's long-standing strengths in performance, scalability, and stability make it a natural fit for developing AI-powered applications, offering the computational efficiency and enterprise-grade reliability that AI solutions demand.

JAVA IS THE LANGUAGE OF CHOICE FOR AI DEVELOPMENT

While Python often dominates conversations around AI development, this survey highlights that for Java-centric developers and businesses, Java remains a top choice. In fact, 50% of organizations use Java to code AI functionality — surpassing both Python and JavaScript [Figure 21].

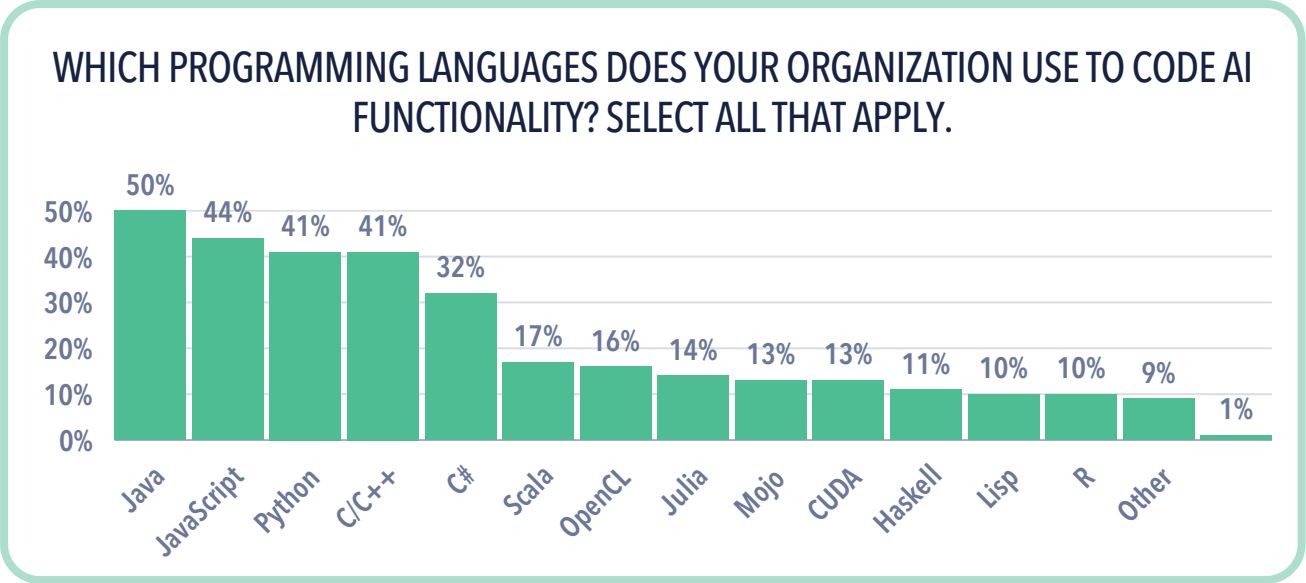


Figure 21 – 50% of companies that build AI functionality internally build it with Java.

Among organizations that use Java to build AI functionality, JavaML is the most commonly used Java AI library [Figure 22].

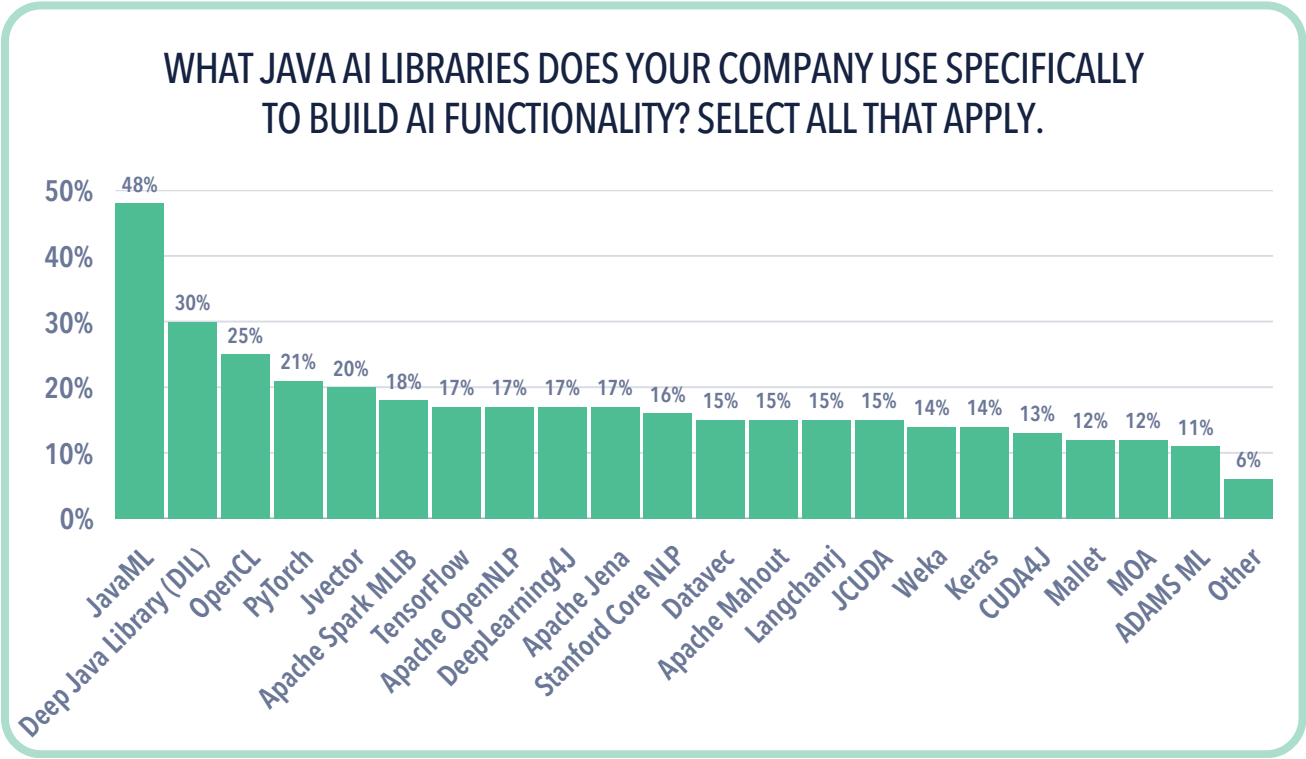


Figure 22 - JavaML is the most commonly used Java AI library in this survey.

Artificial intelligence is having an impact on the way organizations strategize, build code, and maintain applications and infrastructure. All this activity requires compute power, so it's no surprise that 72% of survey participants say their compute consumption will have to grow for them to support Java applications with AI functionality [Figure 23].

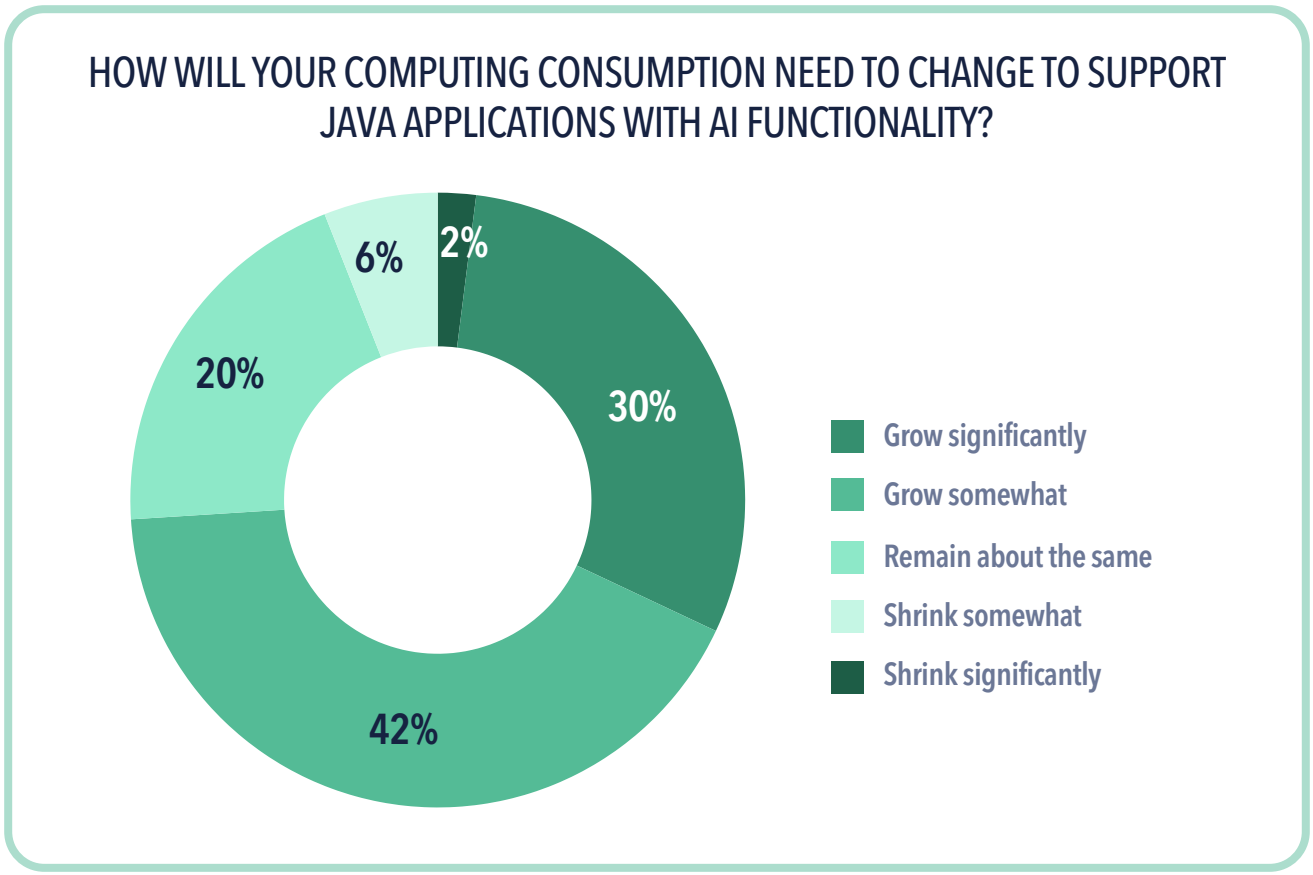


Figure 23 - Compute consumption will have to grow for them to support Java applications with AI functionality.

As this survey focuses on organizations already invested in Java, it's no surprise that Java leads the pack; however, it also highlights that Java developers continue to innovate with Java, leveraging the programming language's robust ecosystem to embrace emerging technologies like AI. This further solidifies Java's role as a cornerstone for modern, future-ready application development.

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CONCLUSION

After three decades, it's clear that Java is more critical for business success than ever before. More than 2,000 Java users were contacted to participate in the 2025 State of Java Survey and Report, and only 1% were disqualified because they didn't use Java or manage a team responsible for Java.

Azul's 2025 State of Java Survey and Report highlights several critical themes that are shaping the Java ecosystem and will remain pivotal in the years ahead. These themes span a range of business and technical concerns, reflecting the evolving priorities of Java-based organizations. On the business front, the rising costs associated with Oracle Java support continue to dominate discussions, prompting a significant majority of companies to re-evaluate their Java strategies. Meanwhile, on the technical front, organizations are trying to make Java as efficient, performant, and affordable as possible in the cloud. They are trying to keep their DevOps teams free to build exciting new features, and they are innovating with AI.

Together, these themes provide valuable insights into the challenges and opportunities Java-based organizations face as they navigate an increasingly complex technological and economic landscape.

THE ORACLE JAVA MIGRATION IS IN FULL SWING

Two years after Oracle announced its employee-based Java pricing and licensing, concern over Oracle's pricing model remains high. Organizations are responding in kind, with 88% considering migrating away from Oracle to another Java distribution/provider.

ORGANIZATIONS ARE OPTIMIZING APPLICATION PERFORMANCE AND CLOUD COSTS

71% of companies say they have more than 20% unused cloud compute capacity they are paying for. Organizations are tackling these cloud costs by employing a variety of strategies including implementing new internal rules for managing cloud instances, adopting FinOps practices, upgrading to more efficient compute instances and processors, and leveraging high-performance JDKs. By using a high-performance JDK, organizations are able to enhance application performance, improve customer satisfaction, and lower compute costs.

UNUSED AND DEAD CODE IS IMPACTING DEVOPS PRODUCTIVITY

62% of survey participants say dead or unused code affects DevOps productivity, and 33% of respondents say more than 50% of their DevOps teams' time is wasted addressing false positives from Java-related security vulnerabilities.

JAVA IS A PLAYER IN AI

50% of organizations are using Java to code AI functionality and Java-based libraries to build AI functionality. 72% of survey participants say their compute consumption will have to grow for them to support Java applications with AI functionality.

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ABOUT THIS SURVEY

Participants from companies of all sizes were invited to participate in this survey on their company's adoption and use of Java. This data was compiled from Java professionals and those that use or deploy Java-based applications and infrastructure at all seniority levels.

A total of 2,039 qualified participants from six continents completed the survey. All participants had direct or managerial Java responsibilities. Dimensional Research, a leading market research firm, administered the electronic survey. Participants were offered token compensation for their participation.

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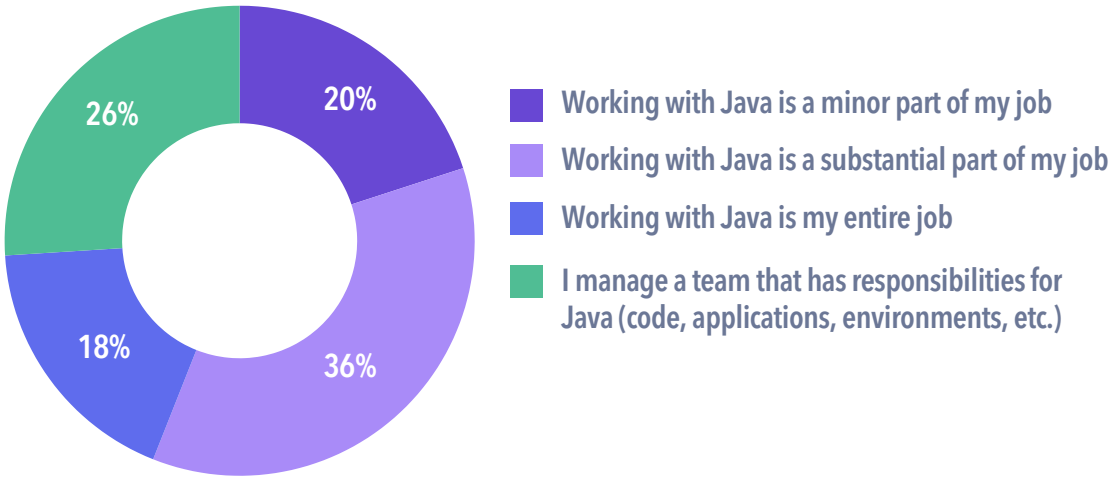
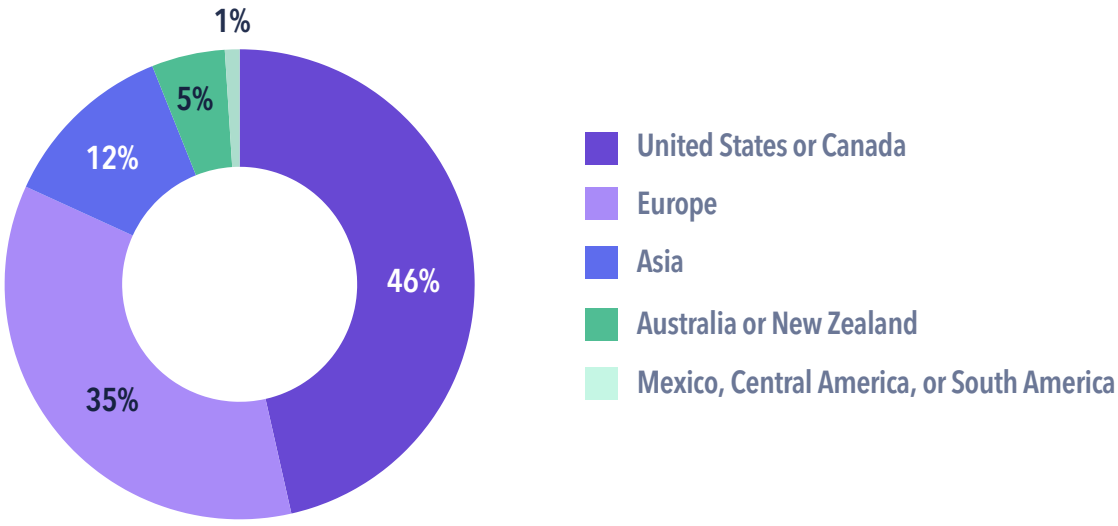
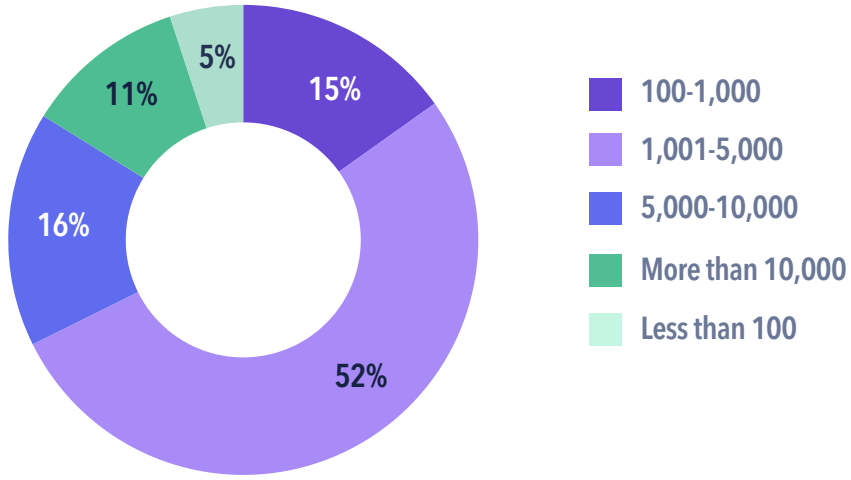
WHICH OF THE FOLLOWING DESCRIBES YOUR RESPONSIBILITIES FOR JAVA (CODE, APPLICATIONS, ENVIRONMENTS, ETC.)?



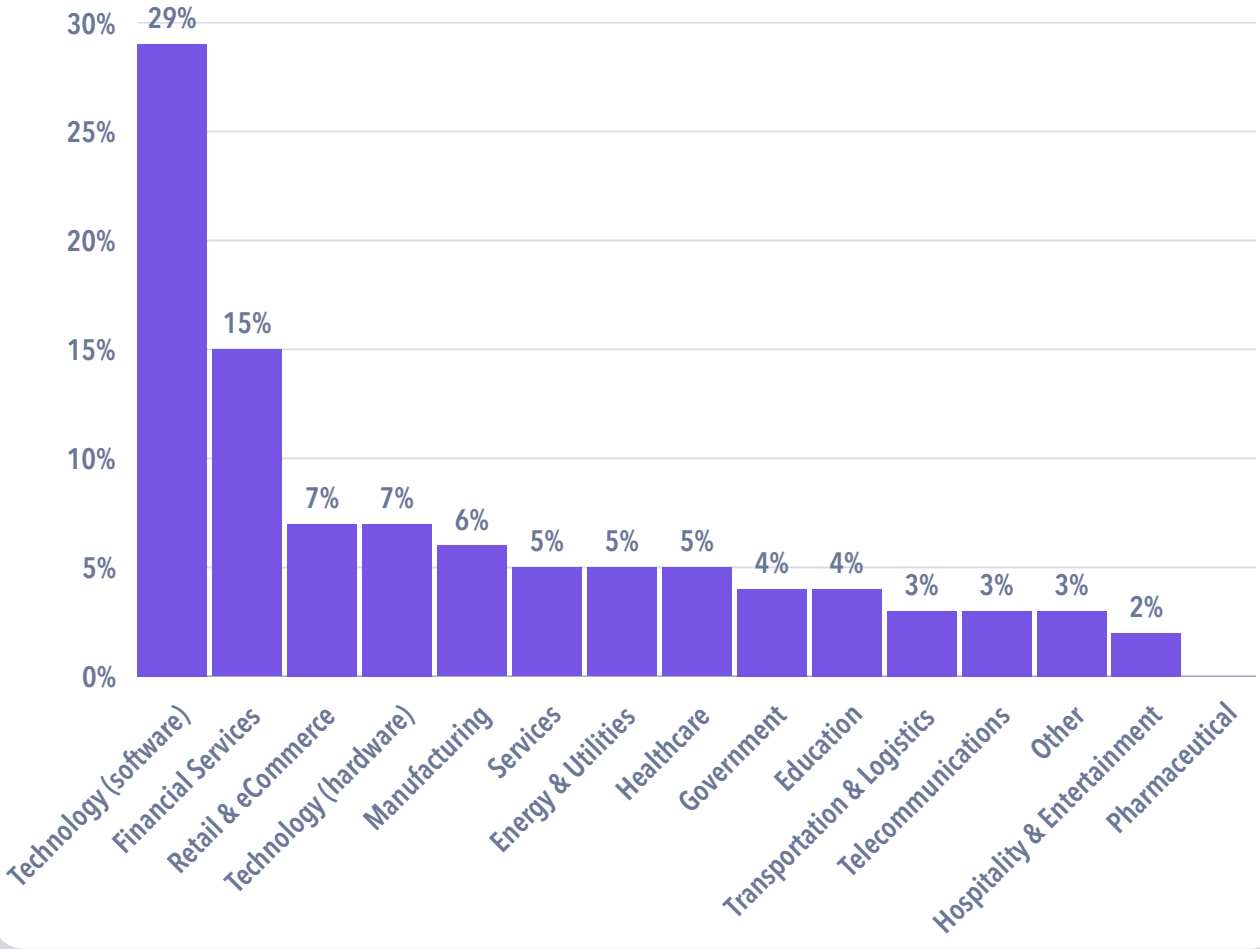
WHERE DO YOU LIVE? CHOOSE THE ANSWER THAT MOST CLEARLY APPLIES.



APPROXIMATELY, HOW MANY PEOPLE DOES YOUR COMPANY EMPLOY?



WHAT IS YOUR ORGANIZATION'S PRIMARY INDUSTRY?



ABOUT AZUL

Headquartered in Sunnyvale, California, Azul provides the Java platform for the modern cloud enterprise. Azul is the only company 100% focused on Java. Millions of Java developers, hundreds of millions of devices, and the world's most highly regarded businesses trust Azul to power their applications with exceptional capabilities, performance, security, value, and success. Azul customers include 36% of the Fortune 100, 50% of the Forbes Top-Ten World's Most Valuable Brands, all 10 of the world's top 10 financial trading companies, and leading brands like Avaya, Bazaarvoice, BMW, Deutsche Telekom, LG, Mastercard, Mizuho, Priceline, Salesforce, Software AG, and Workday. Learn more at azul.com and follow us @azulsystems.

ABOUT DIMENSIONAL RESEARCH

Dimensional Research provides practical marketing research to help technology companies make their customers more successful. Our researchers are experts in the people, processes, and technology of corporate IT and understand how IT organizations operate. We partner with our clients to deliver actionable information that reduces risks, increases customer satisfaction, and grows the business. For more information, visit www.dimensionalresearch.com.

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