Addressing Next-Generation Development with Java

Analyst Market Brief

VDC|Research
Insights for the Connected World

This brief establishes the growing demand and need for development solutions such as Java that can both address common business goals as well as next-generation technology trends.

By Chris Rommel, Executive Vice President

Introduction

Today's organizations are facing unprecedented change, risk and uncertainty. Needs for effective digital transformation are reshaping all corners of the technology market. Unrelenting time-to-market and software content creation pressures have driven organizations to fundamentally reevaluate their software development processes as well as the technologies they use.

Over the course of 25 years, many of the technologies, methodologies and goals for software development have changed drastically. In parallel, software evolved from a hidden cog in business infrastructure to the lifeblood of organizational innovation and differentiation. With all of this change in both practice and purpose, however, a few constants have emerged – the use and utility of Java being among them. Few technologies have been able to both evolve to keep pace with market demands as well as cultivate an ecosystem of support and solutions necessary to support prolonged professional use.

Not only has software evolved into a primary vehicle for business differentiation, but it has also emerged as the main mechanism through which many organizations look to align with the key trends facing the industry at large. New initiatives around trends such as security, analytics, DevOps and IoT among others have introduced additional layers and multipliers of complexity into development [See Exhibit 1]. With software code bases exploding in size, complexity and now also in importance to organizational profitability, new technology choices are needed to ensure optimized development.

Exhibit 1: New Technologies/Trends Currently Being Used or Planned to Pursue by Organization (Percentage of Respondents)

Source: VDC Research 2020
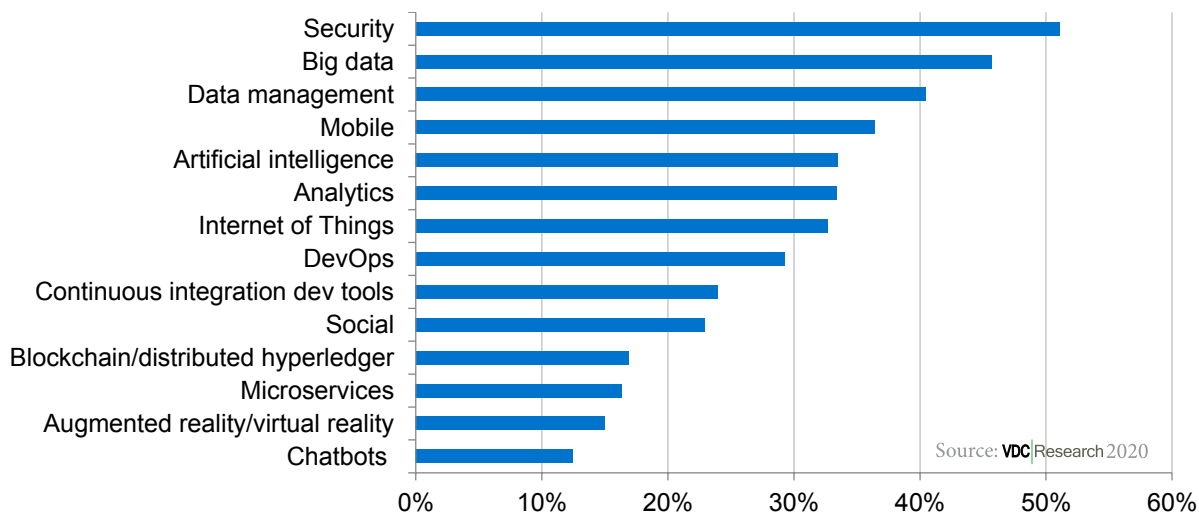
Background on VDC Research

VDC has been covering the software development technology market since 1994. The analysis and supporting discussions in this paper are based on VDC's ongoing research in this market and by findings from a 2020 survey of 570 technology executives, manager and developers. This global survey offers insight into leading business and technical trends impacting development organizations as well as the best practices and technologies implemented to address them.

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As development organizations strive to adapt, the profile of internally developed code bases is changing. In many cases, code growth rates far exceed projected development resource additions. In response to these pressures and resource shortfalls, legacy code assets have been placed at a premium as more organizations are compelled to maximize value from existing assets and prioritize reuse. The ecosystem of third-party code and libraries has also emerged as an additional asset for organizations to mitigate the demands placed on development resources. In-house and hand-coded software, however, remains the key driver of software innovation, placing a significant premium on the selection of coding languages and platforms.

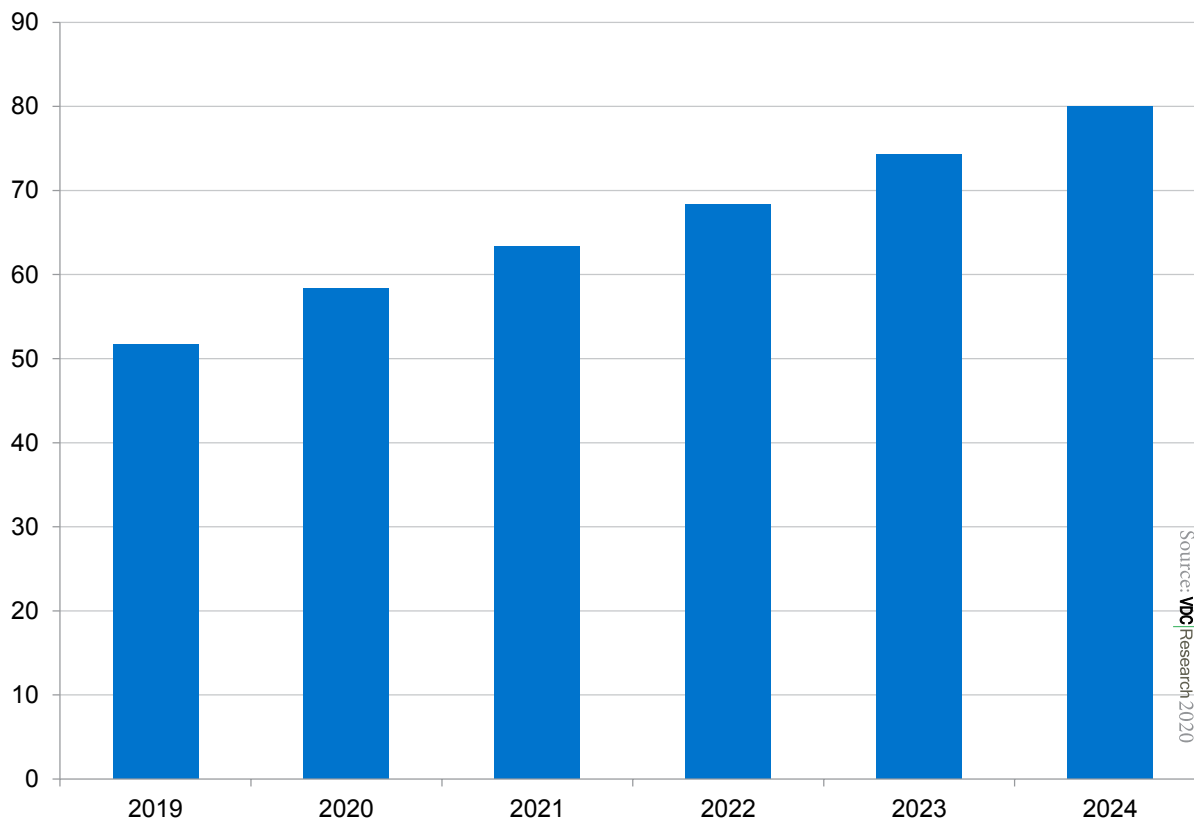Exhibit 2: Percent of In-House Software From Different Sources
(Mean of Responses)
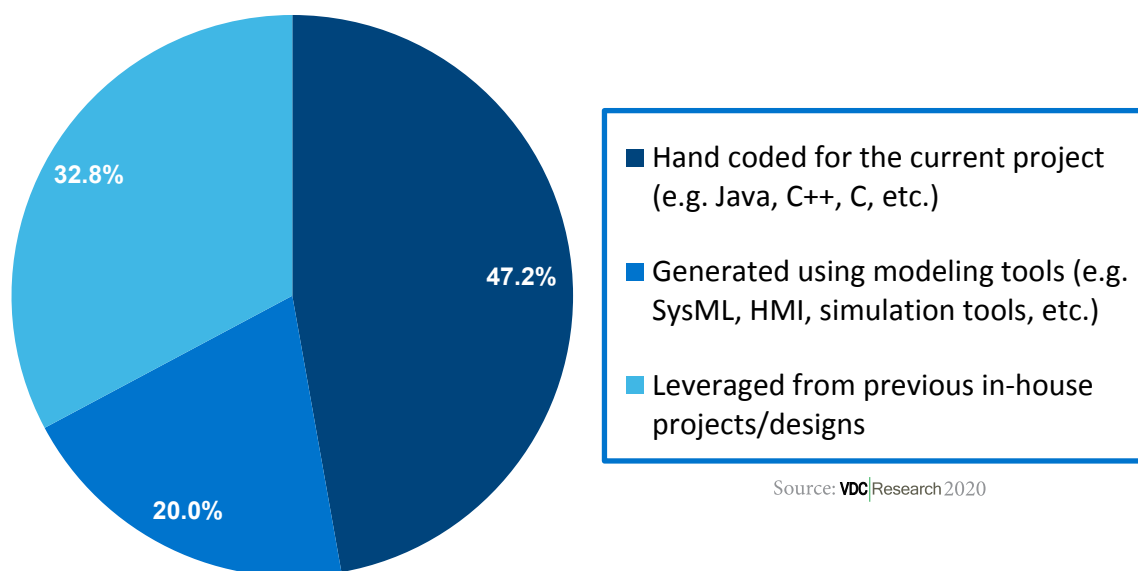
Source: VDC Research 2020

The composition of tomorrow's code bases will be more diverse, not less. Many developers cite the use of multiple languages on their current projects. Given the rise in specialization of IP and algorithms targeting the market trends we mentioned above, we expect this type of fragmentation to continue. The utility and application of these new software development languages, however, will not cannibalize the need for established and incumbent languages. In fact, as organizations mature and scale their pursuit of next-generation initiatives, many recognize the value from leveraging proven technology that can boast utility addressing a wide range of those trends.

To this end, Java not only remains a leading choice, cited by 41% of respondents in their personal use, but it is expected to be used by an even higher percentage of respondents in three years. This trend is remarkable given the technology's use over the course of 25 years, at time at which one would otherwise expect its adoption to have plateaued or be on the decline. As a further testament to the recognition of its utility, our research shows that when Java is used, it is gaining an increasing share of development investment and IP – a trend that is especially noteworthy since our research showed that developers, on average, cite the use of over three languages on their current project. With more organizations recognizing the need to easily leverage code assets from project to project as well as the need for a strong ecosystem of third-party resources, we expect Java's value to maintain is resonance given its object-oriented nature as well as the extensive libraries available. Additionally, when assessing the technology, it is also important to understand the reach and strength of its ecosystem. Java, having

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been designed into projects as diverse as small devices to large-scale network management systems over the course of decades, boasts an installed base that translates to tens of billions of JVMs – a market footprint expected to grow at over 9% per year over the next 5 years [See Exhibit 3].

Exhibit 3: Total Active JVMs/Images Worldwide
(Billions)

Source: VDC Research 2020

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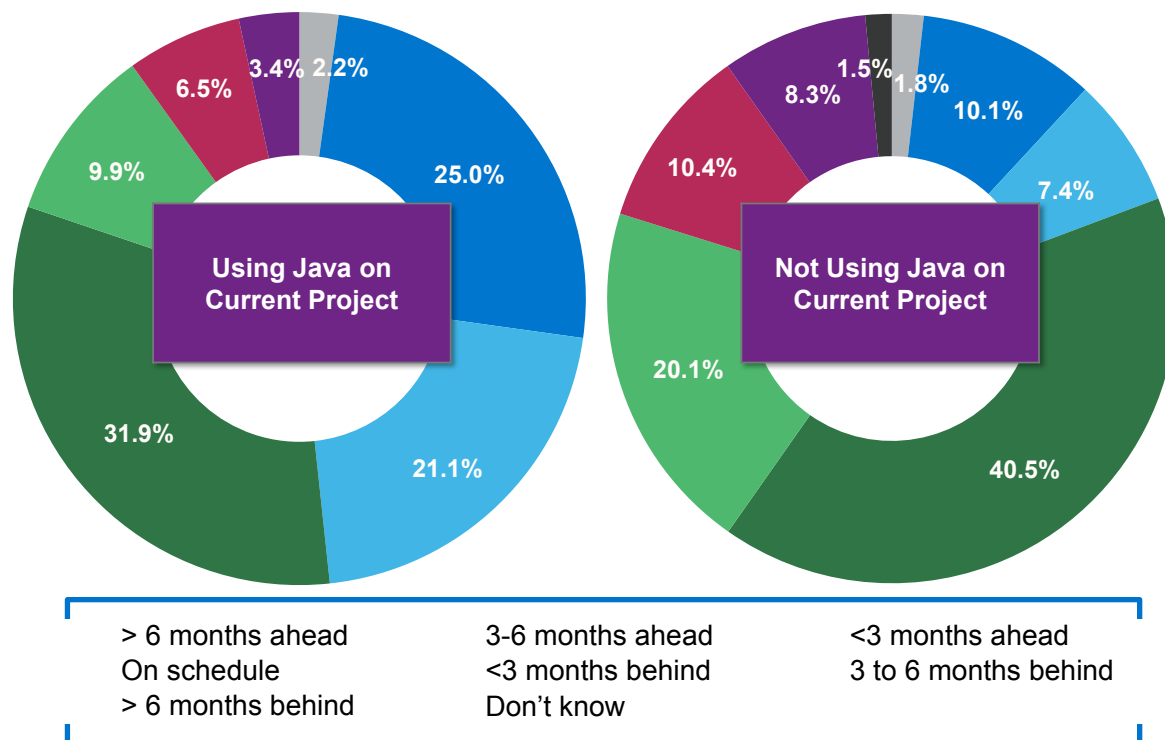Brewing Success with Java

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Despite the advances in enabling technology and gains in developer productivity, functionality demands and shrinking time-to-market windows have continued to pressure development project schedules. In fact, 31% of respondents reported projects behind schedule – a rate that has remained relatively consistent for over a decade in similar surveys conducted by VDC. Any deviation from schedule can cause lost revenue, bloated development costs, and a cascading impact of resource allocation issues across current and future projects. With no decline in the pace of innovation or time-to-market pressures, it is clear that change is needed.

As organizations look to navigate the array of choices in platforms and technologies, programming language has again emerged as a key lever for both differentiation and corporate agility. In fact, projects using Java were two-and-half times more likely to be ahead of schedule compared to projects not using Java. At a time when economic pressures can put acute pressures and focus

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on development costs, enhancing efficiency – or at least minimizing risk of cost overruns – brings significant value. Not only are schedule adherence rates generally better for the projects using Java, but there is even less financial risk associated with any delays since the average cost of software development labor is lower than that for more niche languages.

Exhibit 4: Schedule Adherence, Segmented by Java Use on Current Project
(Percentage of Respondents)

Using Java on Current Project

- 25.0%
- 21.1%
- 31.9%
- 9.9%
- 6.5%
- 3.4%
- 2.2%

Not Using Java on Current Project

- 10.1%
- 7.4%
- 40.5%
- 20.1%
- 10.4%
- 8.3%
- 1.5%
- 1.8%

> 6 months ahead	3-6 months ahead	<3 months ahead
On schedule	<3 months behind	3 to 6 months behind
> 6 months behind	Don't know	

Source: VDC Research 2020

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Beyond a growth in deployed software content, today's applications and systems are producing an exploding amount of data. The intelligent and ubiquitous functionality needed to power today's AI- and analytics-driven applications requires technology to support both localized, native decisions and as well as an intelligent infrastructure to support integration across broader IT networks.

Exhibit 5: Cloud Utilization
(Percentage of Respondents)
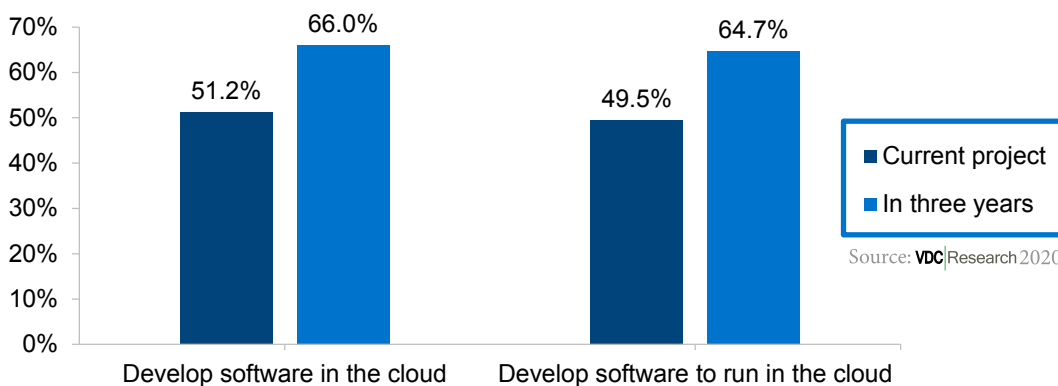
The far-reaching effects of these data-driven initiatives is causing more churn in technology reevaluation. Organizations can no longer afford to lock themselves into closed platforms or limited ecosystems that hinder corporate agility. Many legacy and in-house runtimes were simply not designed to support that level of functionality and interoperability. Furthermore, organizations now have to contend with growing issues related to data management. If the value of the data generated from these increasingly sophisticated system is to be realized, the over-arching system must ideally be architected for heterogeneous data flows from the smallest devices to the most robust data centers. For this intra-network sharing to occur efficiently, not only must systems and devices be discoverable, but the data delivery interfaces must also be standardized, further reinforcing the need for commercial software technologies such as Java. Further aligning with this trend, last year, Oracle announced that its Cloud Infrastructure solution would include a subscription to Java SE, providing support for the needs of data-intensive deployments. This announcement should help Oracle build even further on Java's existing leadership in Cloud development. Not only are there already billions of Cloud-connected JVMs already in the field today [See Exhibit 6], but Java is the top programming language for both Cloud development and deployment [See Exhibit 7].

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Exhibit 6: Total Cloud-Connected Active JVMs/Images Worldwide
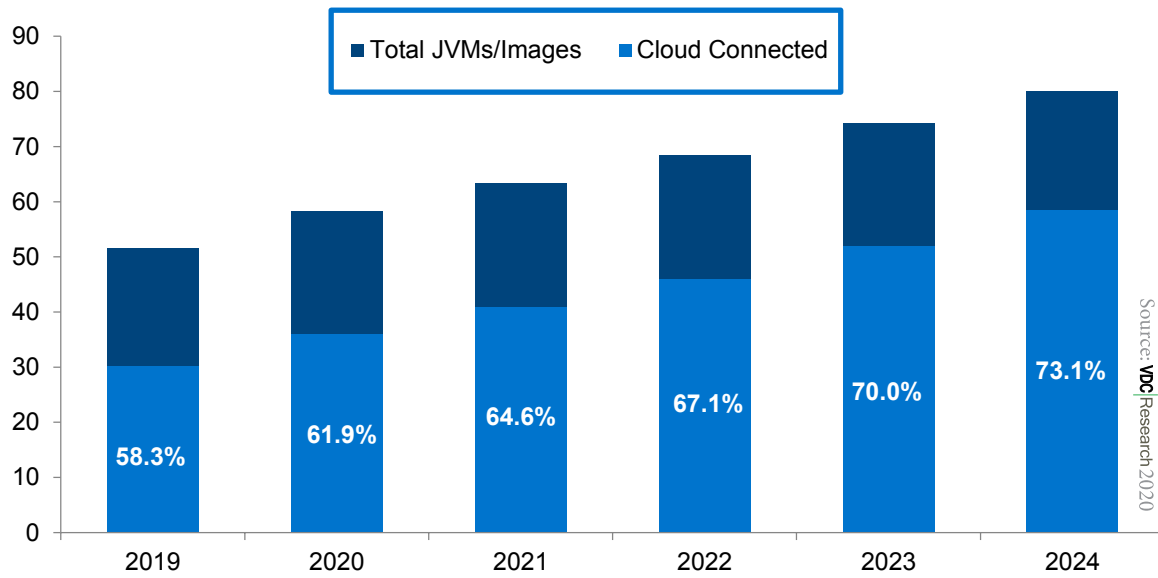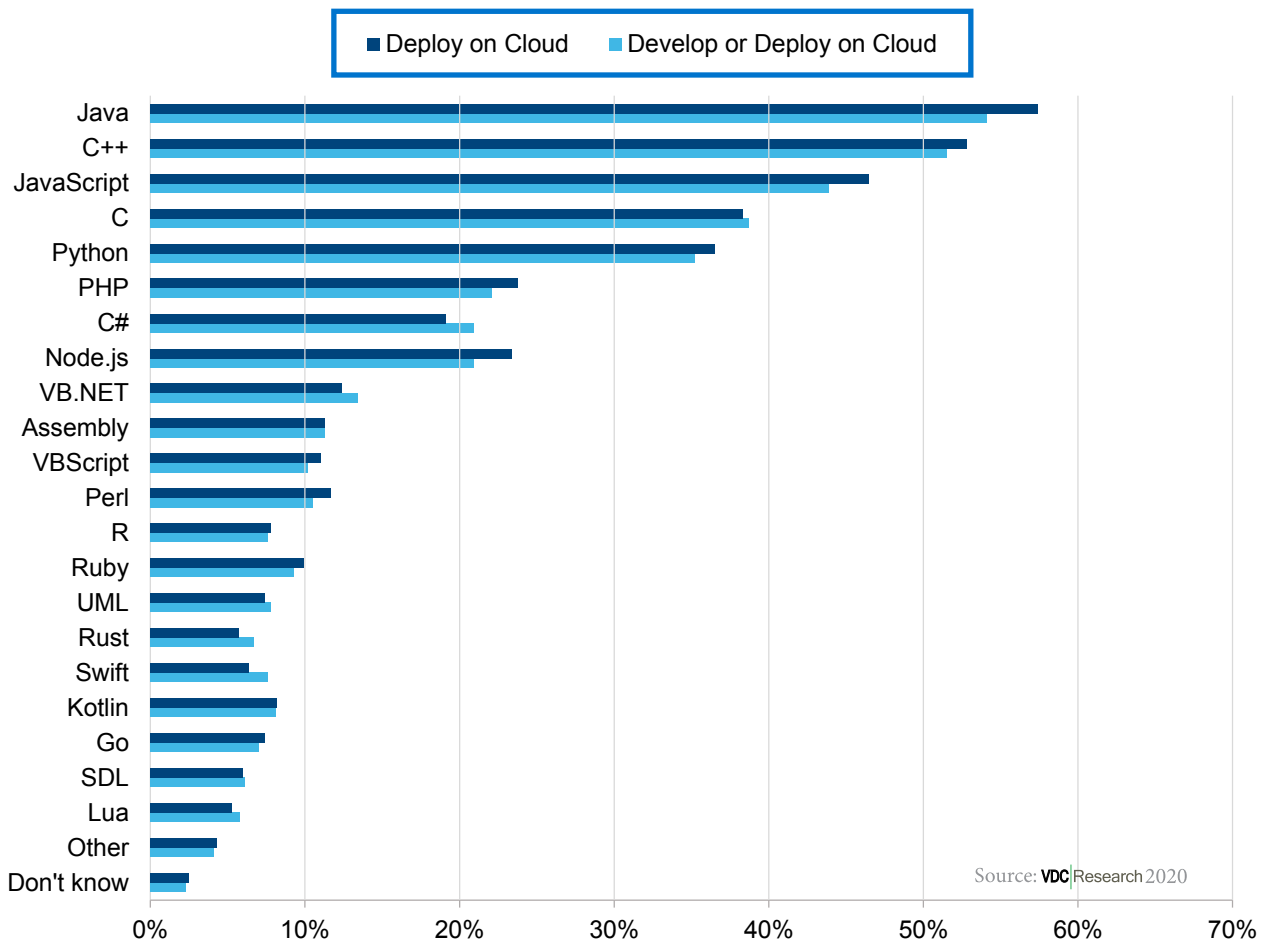(Billions)

Source: VDC Research 2020

Exhibit 7: Programming Language Used Personally on Current Project, Segmented on Cloud Use for Current Project
(Percentage of Respondants)

Source: VDC Research 2020

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Java is widely recognized as a leading technology for addressing the top trends facing development organizations today. After respondents in our survey identified the trends their organization were pursuing, we asked them to rate each programming language being used for its utility addressing those trends.

Among the 21 different languages assessed, Java earned the **highest overall average ranking** across the 14 trends evaluated and achieved the top rating for **9 out of those 14 trends** [See Exhibit 8].
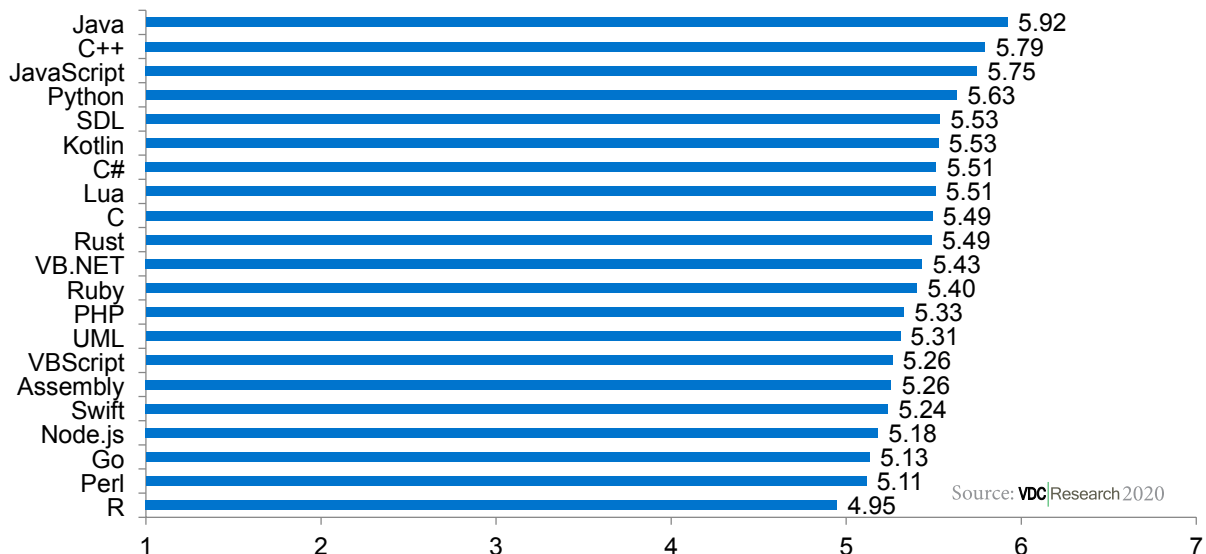
Exhibit 8: Java's Rank among Languages in Rated Importance for Key Trends
(Rank based on mean ratings from Not At All Important to Extremely Important)

#1 Analytics	**#3** Artificial intelligence	**#2** Augmented reality/virtual reality	**#1** Big data	**#2** Blockchain/ distributed hyperledger	**#1** Chatbots	**#1** Continuous integration dev tools
#1 Data management	**#1** DevOps	**#2** Internet of Things	**#1** Microservices	**#1** Mobile	**#2** Security	**#1** Social

In fact, Java was so consistently highly rated that, for those trends for which it was not first, it was, with one exception, second. Furthermore, when we separately asked respondents to rate the languages used for their overall importance to their organization, Java was the overwhelming leading response, garnering a 5.92 mean response out of a seven-point Likert scale [See Exhibit 9]. In the three consecutive years that VDC has conducted this particular survey, Java has gained first-place rankings in both this criterion as well as the aforementioned average across the technology trend categories. We believe the continued, highly-rated sentiment for Java in addressing next-generation trends will drive and sustain Java's use in the future within the professional development ranks.

Exhibit 9: Importance of Each Programming Language to Organization
(Mean of Responses, 1=Not At All Important, 7=Extremely Important)

Language	Mean
Java	5.92
C++	5.79
JavaScript	5.75
Python	5.63
SDL	5.53
Kotlin	5.53
C#	5.51
Lua	5.51
C	5.49
Rust	5.49
VB.NET	5.43
Ruby	5.40
PHP	5.33
UML	5.31
VBScript	5.26
Assembly	5.26
Swift	5.24
Node.js	5.18
Go	5.13
Perl	5.11
R	4.95

Source: VDC|Research 2020

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The demands placed on software development organizations have never been higher. New trends and business initiatives are recasting value chains and productivity expectations. Organizations are now forced to reevaluate development processes and technologies to keep pace with the innovation and requirements seen in the industry today. Our research highlighted Java as not only a stalwart of development practices, but also a key mechanism to address both productivity and next-generation business trends.

After twenty-five years of supporting software development, Java has once again emerged as a critical asset for organizations looking to efficiently navigate new business needs. Across the wide range of important trends organizations are addressing today, our research highlighted Java's ubiquity as well as its lasting and wide-ranging utility. Since its inception, Java has been targeted for use across a wide range of system types – from small embedded devices to IT datacenters to web content generation. Its 'write once, run anywhere' mantra has helped fuel its proliferation across billions of systems. Java's object-oriented nature and additions of compact profiles and lambdas helped maintain its position as a leading solution to both speed development and facilitate software asset reuse. While many aspects of development will remain highly specialized, identifying ways to improve software content reuse and portability across systems is critical to maximizing value from next-generation deployments – to both accelerate time to market and reduce recurring software development burdens. Object oriented languages such as Java can help address these needs, which offer developers additional means to develop software more efficiently. Furthermore, our research showed that Java users projects were two-and-a-half times more likely to be ahead of schedule than those not using the technology.

Oracle Guiding Java to Sustained Ecosystem Value

After Oracle acquired SUN a decade ago, Oracle made a range of investments to further the impact within the community. First off, the company invested in OpenJDK, helping it reach the level of maturity needed for the professional development ranks and to provide a foundation for the ecosystems growth outside of Oracle's own direct commercial interests. Oracle also transitioned Java from feature-based releases – which were often spaced out by years – to semiannual releases, allowing their customers to accelerate upgrades and take advantage of the newest Java-based technology. Additionally, Oracle's stewardship of Java has helped fuel additional stability and regularity with patches. With the sandbox model and cryptography support, developers have additional means to tackle the security issues that today's organizations must navigate. Furthermore, Oracle's GraalVM initiative has helped extend Java's suitability for cloud-native applications at a time when 66% of developers expect to develop their software in the cloud within three years and 64% expect it to be deployed on the cloud. It is clear that Oracle has maintained Java's legacy of ecosystem support and innovation.

Despite many questions that once revolved around Oracle's acquisition of SUN and its future plans for Java, Oracle has proven a trusted steward of the Java ecosystem. When we asked our survey respondents to rate Oracle as well as its recent initiatives in the ecosystem, the organization received high marks [See Exhibit 10]. Of particular note, the aforementioned integration of a Java SE subscription with the company's Cloud Infrastructure offering was perceived quite positively, with a mean of 5.92 on a seven-point Likert scale.

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Exhibit 10: Perception of Oracle and Java Ecosystem
(Mean of Responses; 3 Discrete Questions Presented in Chart Below)
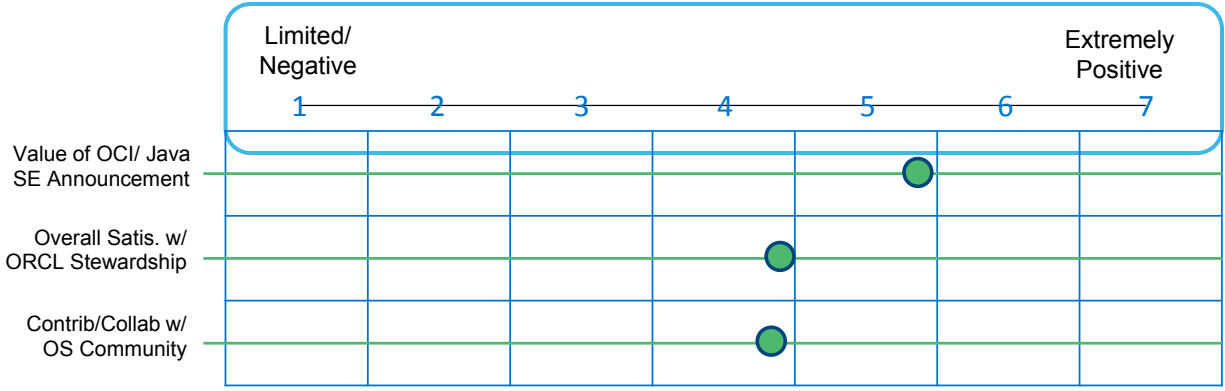
Source: VDC Research 2020

Beyond the positive sentiments reflected in our respondent pool, the objectively interesting breadth of Java deployments undertaken by the participants served as another reminder to VDC of Java's presence in the ecosystem at large. With projects ranging from those using Java Card to large-scale content management server deployments, Java remains a key driver of many influential technologies today. Participants highlighted everything from its use in disaster recover web servers, secure medical HIPPA transaction implementations, access control systems with face recognition, systems brokering cloud-to-device interactions for energy automation to embedded system design for the leading all-electric car manufacturer in North America. Given the range of successful deployments as well as the quantitative results to our research, we believe that Java not only aligns with the organic change in development needs within the industry, but it also has the capabilities to help development organizations optimize their solutions and position themselves for success in the future.

About The Author

Chris Rommel is responsible for syndicated research and consulting engagements focused on development and deployment solutions for intelligent systems. He has helped a wide variety of clients respond to and capitalize on the leading trends impacting next-generation device markets, such as security, the Internet of Things, and M2M connectivity, as well as the growing need for system-level lifecycle management solutions. Chris has also led a range of proprietary consulting projects, including competitive analyses, strategic marketing initiative support, ecosystem development strategies, and vertical market opportunity assessments. Chris holds a B.A. in Business Economics and a B.A. in Public and Private Sector Organization from Brown University.

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