



2022

The State of
**Enterprise
Open Source**

A Red Hat® Report



After two years of working through the pandemic, organizations around the world are settling into new ways of operating. COVID-19 forced companies to figure out how to work remotely. They had to learn how to meet immediate customer needs, while adding the agility to adapt to a still-unknown future. However, this way of working is something that open source communities have been doing for more than 25 years. These communities, as well as the companies that participate in them, had a head start on distributed collaboration. The open source solutions built from this innovation are now being looked to as the blueprint for other entities.

What we found as we embarked on our fourth annual “The State of Enterprise Open Source: A Red Hat Report” is that not only is the open source development model showing no signs of slowing down, it has actually accelerated during the pandemic. As proof points, we see more companies bringing products to market based on open source projects while communities like Operate First, Fedora, and Kubernetes are thriving.

The report, which explores why enterprise leaders are choosing the open source development model and technologies built with this model, found that 92% of IT leaders surveyed feel enterprise open source solutions are important to addressing their COVID-related challenges.* This is not surprising to me, considering the moves I saw many businesses make towards the open hybrid cloud even before the pandemic. Whether an intentional architecture choice or a result of rapid market changes, cloud computing and always-on services built using the open source development model and open source code are increasingly crucial to nearly every organization regardless of industry.

The open hybrid cloud enables innovation, providing the framework that brings together applications running on premise whether because of legacy or by design, with the best of any cloud provider (private or public) all based on open source. This trait is also reflected within the report, as outside of the pandemic challenges we saw 95% of respondents say that enterprise open source is important to their organization’s overall enterprise infrastructure.**

Why? It’s because of the innovation and agility the model makes possible. Some technology persists for decades if not longer, and the decisions IT leaders are making today will impact their organizations’ nimbleness and market response down the road, whether it’s in two years or 20. As new infrastructure is being built out, you can’t leave behind existing systems and tools. You need products and services that work with them. That’s the value of open source. As we said in the very first report: “The question is no longer whether your enterprise should adopt open technologies; the question is when—and how.”

There’s so much to digest in this report, but what I hope you will take away is that while the open source development model may have started in the playground of developers, hackers and visionaries decades ago, we’ve moved far past that. It’s now a mainstream part of commercial software development and the engine for consistent innovation—from the server room to public clouds to the edge and beyond.



Paul Cormier
President and CEO, Red Hat

About this report

Commentary throughout the report is written by Gordon Haff, a technology advocate at Red Hat. Gordon writes about technology, trends, and their business impact. He is a frequent speaker at customer and industry events. He has authored books including *How Open Source Ate Software* and *From Pots and Vats to Programs and Apps*.

1296

Total interviews were conducted with IT leaders worldwide

150

Completed submissions from English-speaking Asia Pacific (APAC)

448

Completed submissions from Europe, the Middle East, and Africa (EMEA)

300

Completed submissions from Latin America (LATAM)

398

Completed submissions from the United States (U.S.)

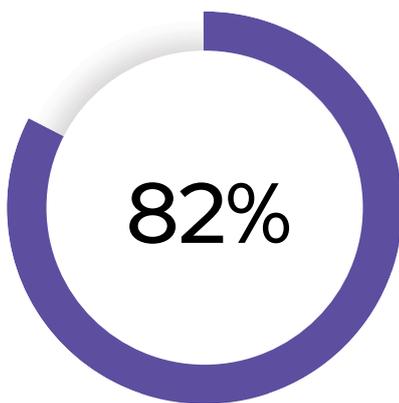
Respondents were unaware that Red Hat was the sponsor of this survey. Respondents had to influence purchase decisions within their organization in app development, app infrastructure, cloud, storage, middleware, server OS, or virtualization. Respondents had to be familiar with enterprise open source, and have at least 1% Linux® installed at their organizations. EMEA includes the United Kingdom, Germany, and the United Arab Emirates. English-speaking APAC includes Australia, New Zealand, Hong Kong, and Singapore. LATAM includes Argentina, Brazil, Chile, Colombia, Mexico, and Peru. Research conducted in 2021.

Why vendor contribution to open source matters

Last year, for the first time in this annual survey, we asked IT leaders if they cared whether their vendors contributed to open source projects.

We were not sure what the result would be. However, we suspected responses would be somewhere between indifference and mildly positive. We were wrong. In fact, our respondents were overwhelmingly more likely to select vendors who contributed to open source communities.

This year, we asked the question again. Again, the positive response was overwhelming, with a total of 82% almost evenly split between saying they were “much more likely” and “somewhat more likely” to select a contributing vendor.



82% of IT leaders are more likely to select a vendor who contributes to the open source community.

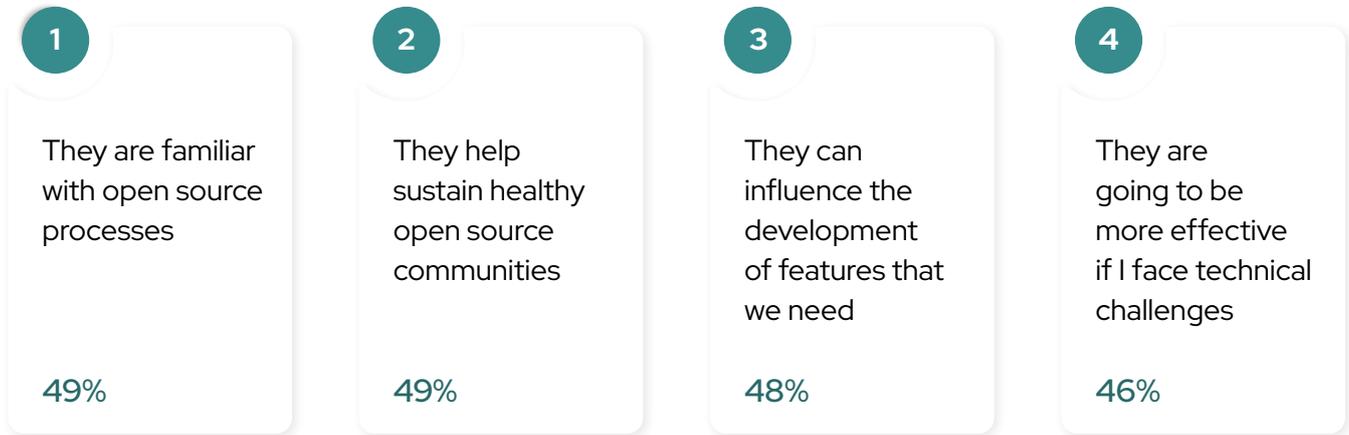
(APAC = 77%, EMEA = 82%, LATAM = 83%, U.S. = 82%)

While Red Hat understands the many benefits our customers (and more broadly, the open source community) gain when we and others contribute to upstream communities, we also wondered why the IT leaders we surveyed cared. So we asked them.

Responses were roughly evenly split among the choices provided. Most reflected how full participation in the open source development model by default allows a vendor to build expertise and to otherwise influence development roadmaps in ways that benefit users directly.

At the same time, we were pleased to see that one top response identified the value of contribution as helping “sustain healthy open source communities.” Sustainability is perhaps a subtler point than the first-order benefits. It is gratifying to see that so many respondents appreciate the importance of healthy open source projects.

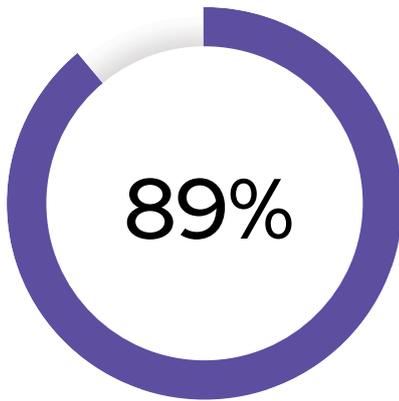
Top reasons why enterprise open source vendors are preferred



| | APAC | EMEA | LATAM | U.S. |
|--|--|--|--|--|
| | Familiar with open source processes— 51% | Help sustain healthy communities— 49% | Influence the development of features that we need— 54% | Familiar with open source processes— 51% |
| | Help sustain healthy communities— 49% | Influence the development of features that we need— 49% | Help sustain healthy communities— 53% | Effective if I face technical challenges— 48% |
| | Effective if I face technical challenges— 45% | Effective if I face technical challenges— 46% | Familiar with open source processes— 52% | Help sustain healthy communities— 45% |
| | Influence the development of features that we need— 43% | Familiar with open source processes— 45% | Effective if I face technical challenges— 45% | Influence the development of features that we need— 45% |

Security is a major benefit of enterprise open source

89% of respondents believe that enterprise open source software is as secure or more secure than proprietary software. Overall, the numbers told a story similar to last year’s survey, although the “more secure” choice was up by four percentage points. Anyone who has spent time in the IT industry will recognize that this is a significant shift from mainstream perceptions about open source software from a decade or so ago when open source software security often surfaced as a weakness.



of IT leaders believe enterprise open source is as secure or more secure than proprietary software.

(APAC = 89%, EMEA = 90%, LATAM = 87%, U.S. = 90%)

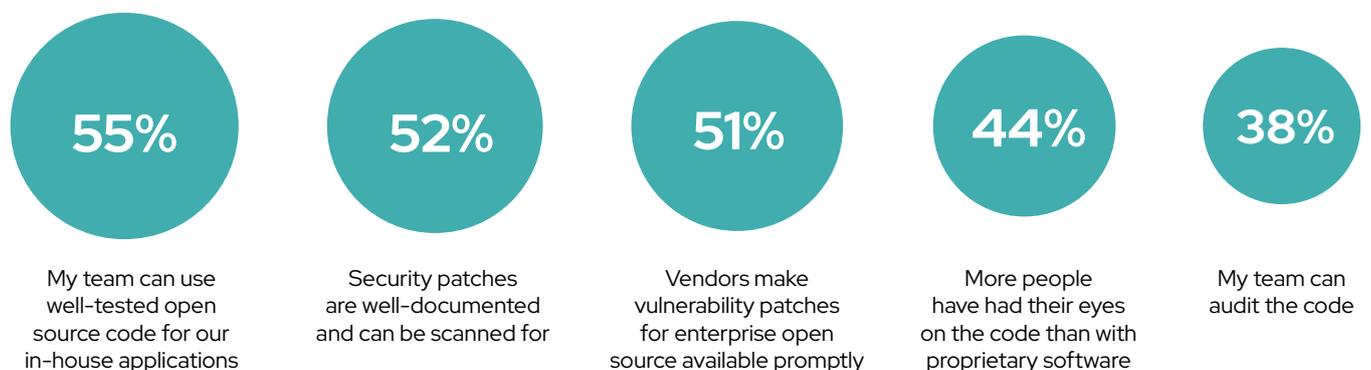
But what makes enterprise open source such a benefit with respect to security? That was another new question we dug into this year.

Interestingly, answers that historically often came up in open source security discussions were at the bottom of the list. Neither the idea that “given enough eyeballs, all bugs are shallow” (to quote a long-standing open source aphorism) nor the ability to audit the code directly were as important to respondents as other benefits. What we might call the mythology of open source security, both for better and worse, seems to be on the way out.

Rather, the top benefit was that their “team can use well-tested open source code for our in-house applications.” This reflects the increasingly widespread use of open source code for internal applications. (It also explains the amount of attention that the security of software supply chains is now receiving.)

Other top benefits reflect the confidence that the IT leaders we surveyed have in how enterprise open source software is created and delivered in general. For example: “Security patches are well-documented and can be scanned for” (one of the aspects of software supply chain security) and “vendors make vulnerability patches for enterprise open source available promptly.”

Why security is a benefit of enterprise open source



| APAC | EMEA | LATAM | U.S. |
|--|--|--|--|
| Security patches are well-documented— 54% | Can use well-tested open source code for our in-house applications— 53% | Can use well-tested open source code for our in-house applications— 59% | Can use well-tested open source code for our in-house applications— 57% |
| Can use well-tested open source code for our in-house applications— 48% | Security patches are well-documented— 51% | Vendors make vulnerability patches available promptly— 53% | Security patches are well-documented— 57% |
| More people have had their eyes on the code— 47% | Vendors make vulnerability patches available promptly— 49% | My team can audit the code— 46% | Vendors make vulnerability patches available promptly— 54% |
| Vendors make vulnerability patches available promptly— 44% | More people have had their eyes on the code— 46% | More people have had their eyes on the code— 44% | More people have had their eyes on the code— 42% |
| My team can audit the code— 35% | My team can audit the code— 43% | Security patches are well-documented— 43% | My team can audit the code— 31% |

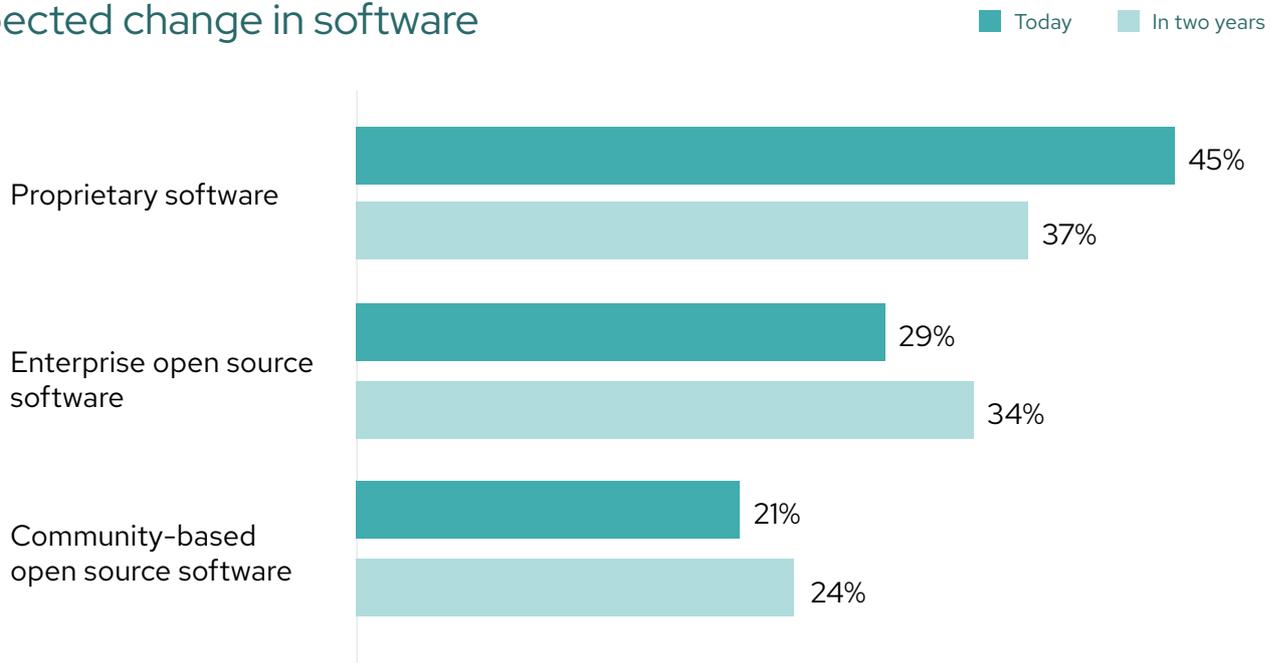
Enterprise open source continues to gain at the expense of proprietary software

Software may be eating the world. But, increasingly, it is enterprise open source software that is doing most of the chewing.

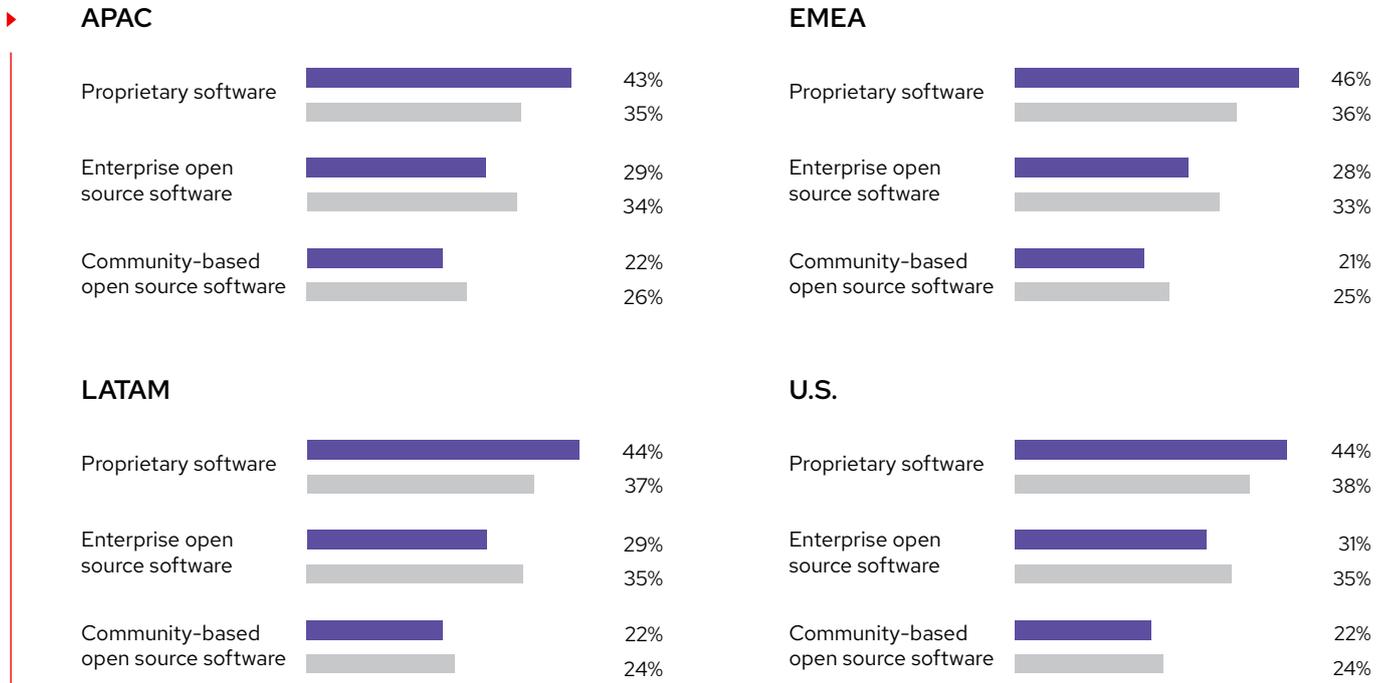
The trend is not subtle. Especially when you consider the fact that enterprise software deployments are not ordinarily known for rapid change.

Proprietary software as a percentage of the software already in use in respondents’ organizations is expected to drop eight points over the next two years. That is a huge decline. Over the same period, they expect enterprise open source to shoot up five points, with community-based open source also popping up three points over the same period.

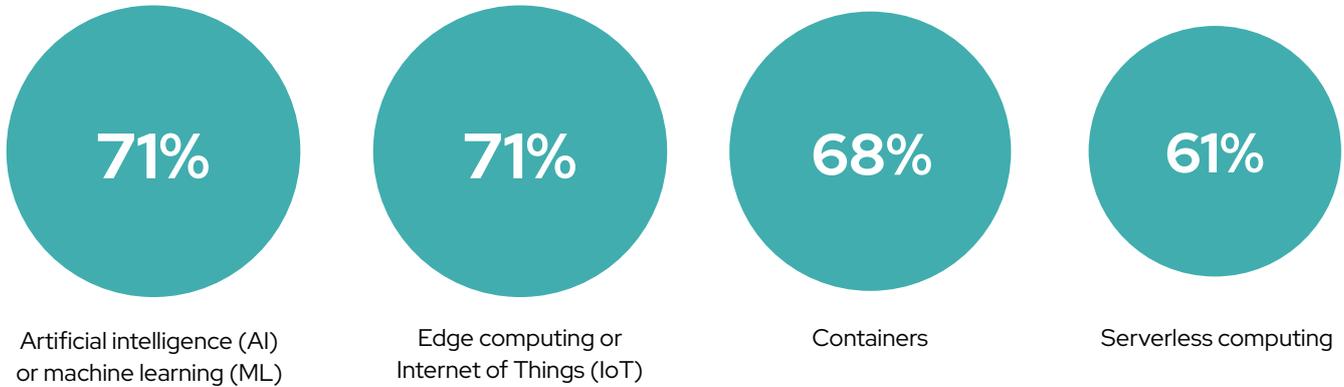
Expected change in software



■ Today ■ In two years

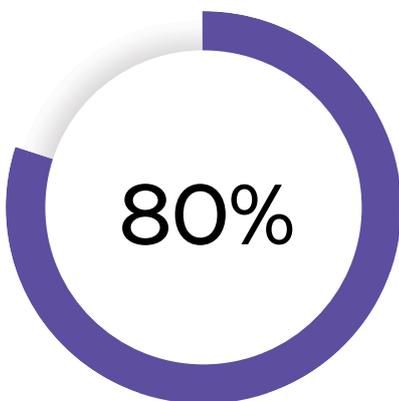


IT leaders are currently making good use of emerging technologies



| | APAC | EMEA | LATAM | U.S. |
|-------------|------|------|-------|------|
| AI or ML | 73% | 70% | 65% | 75% |
| Edge or IoT | 68% | 69% | 71% | 73% |
| Containers | 66% | 63% | 69% | 73% |
| Serverless | 58% | 64% | 58% | 61% |

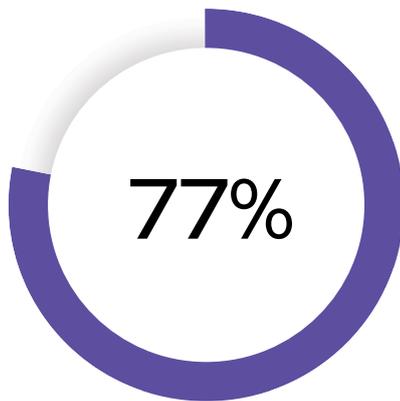
Unsurprisingly, the increasing use of enterprise open source extends to important new emerging technology workloads, with 80% planning to increase their use of enterprise open source in areas such as artificial intelligence (AI), machine learning (ML), edge computing, and the Internet of Things (IoT).



of IT leaders expect to increase their use of enterprise open source software for emerging technologies.

(APAC = 80%, EMEA = 80%, LATAM = 82%, U.S. = 80%)

Why the growth? A big part of it is that the IT leaders we surveyed continue to perceive enterprise open source in an ever more favorable light. An impressive 77% said that they now have a more positive perception of enterprise open source than they did just a year ago.



of IT leaders have a more positive perception of enterprise open source than they did a year ago.

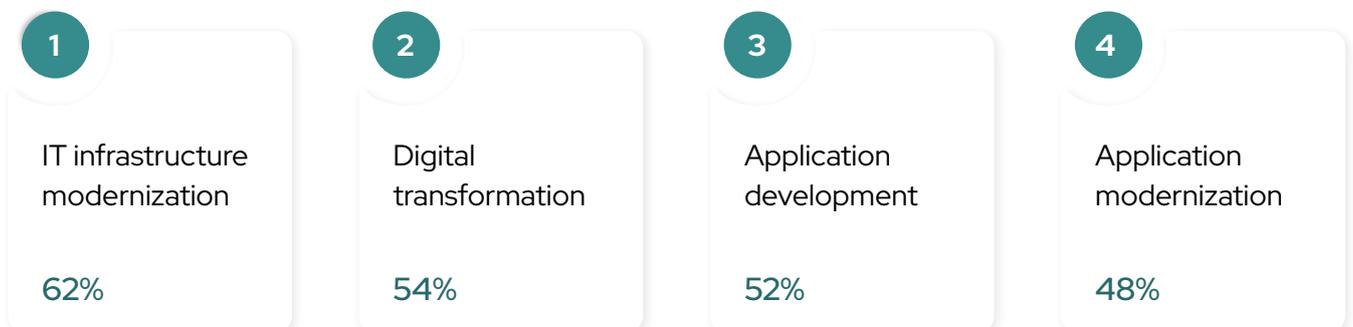
(APAC = 75%, EMEA = 79%, LATAM = 77%, U.S. = 77%)

How are organizations using enterprise open source?

Infrastructure modernization consistently takes the top position when we ask IT leaders how they are using enterprise open source software and solutions in their organizations. Historically, this would often have meant they were ripping out their proprietary software and sliding in enterprise open source in its place.

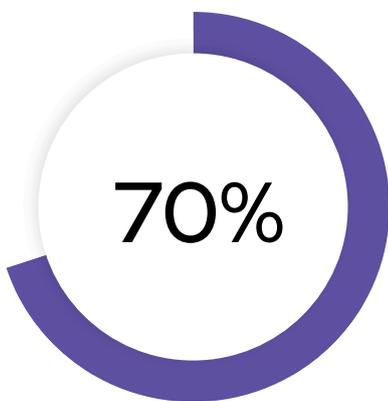
That still happens, but there are also whole new categories of software that didn't exist to any significant degree in the proprietary software world.

Top uses for enterprise open source



| | APAC | EMEA | LATAM | U.S. |
|----------------------------------|------|------|-------|------|
| IT infrastructure modernization | 63% | 59% | 65% | 62% |
| Digital transformation | 52% | 55% | 59% | 56% |
| Application modernization | 46% | 49% | 50% | 55% |
| Hybrid or multi-cloud management | 45% | 47% | 47% | 50% |

Containers, Kubernetes for the associated container orchestration, and the vast number of complementary cloud-native open source projects may be the best examples of new categories of software. It is a software ecosystem that’s growing and shows no signs of slowing down. 70% of IT leaders we surveyed work for organizations that use Kubernetes and almost a third plan to significantly increase their use of containers over the next 12 months.*



70% of IT leaders work for organizations that use Kubernetes.

(APAC = 67%, EMEA = 70%, LATAM = 73%, U.S. = 68%)

All this infrastructure modernization (along with other leading uses of enterprise open source such as application development and digital transformation) does come with a downside though. When asked about barriers to adopting containers, the top obstacle varied slightly by geographical region but they were mostly either the lack of development staff, overall resources, or necessary skills. This is consistent with what we are seeing both anecdotally and in other surveys we have conducted.

Obstacles to adopting containers



| APAC | EMEA | LATAM | U.S. |
|---|---|---|---|
| Development staff or resources— 51% | Necessary skills for adoption— 41% | Necessary skills for adoption— 47% | Necessary skills for adoption— 41% |
| Necessary skills for adoption— 48% | Development staff or resources— 39% | Development staff or resources— 44% | No applications to containerize— 32% |
| No applications to containerize— 31% | No applications to containerize— 37% | No applications to containerize— 31% | Development staff or resources— 31% |
| We don't have the time— 17% | We don't have the time— 33% | We don't have the time— 30% | We don't have the time— 29% |

Top barriers to broad enterprise open source adoption are roughly similar to the results from prior years. They include concerns such as the level of support, compatibility, and security. These closely mirror some of the IT leader concerns we hear about commercial proprietary software.

Perceived barriers to using enterprise open source



| APAC | EMEA | LATAM | U.S. |
|--|--|--|---|
| Lack of internal skills to manage and support enterprise open source— 37% | Lack of internal skills to manage and support enterprise open source— 34% | Concerns about the level of support & Compatibility concerns— 38% | Concerns about the level of support— 39% |
| Concerns about the level of support— 34% | Concerns about the level of support— 32% | Concerns about inherent security of code— 36% | Concerns about inherent security of code— 35% |
| Concerns about inherent security of code— 32% | Not enough peer orgs using desired enterprise open source— 31% | Not enough peer orgs using desired enterprise open source & Lack of testing or proven track record— 30% | Smaller technology ecosystem vs. proprietary software— 33% |
| Compatibility concerns— 31% | Compatibility concerns & Smaller technology ecosystem vs. proprietary software— 30% | Lack of internal skills to manage and support enterprise open source— 28% | Compatibility concerns— 32% |

The benefits are broad and strategic

When we began running this survey four years ago, the top benefit of enterprise open source was clear: lower total cost of ownership (TCO). This result was likely a surprise to no one. Linux, along with enterprise open source more generally, was adopted by companies in no small part because it was a less expensive alternative to proprietary UNIX and proprietary networking-related applications. Even if this view of enterprise open source began to increasingly diverge from reality, it remained a stereotype.



“Open source is an engine of innovation for the financial industry. In 2001, when we migrated from UNIX to Linux, we didn’t know we were changing our business. From standard foundations that increase productivity to the communities that foster the next frontiers of technology, open source opens doors to the future.”

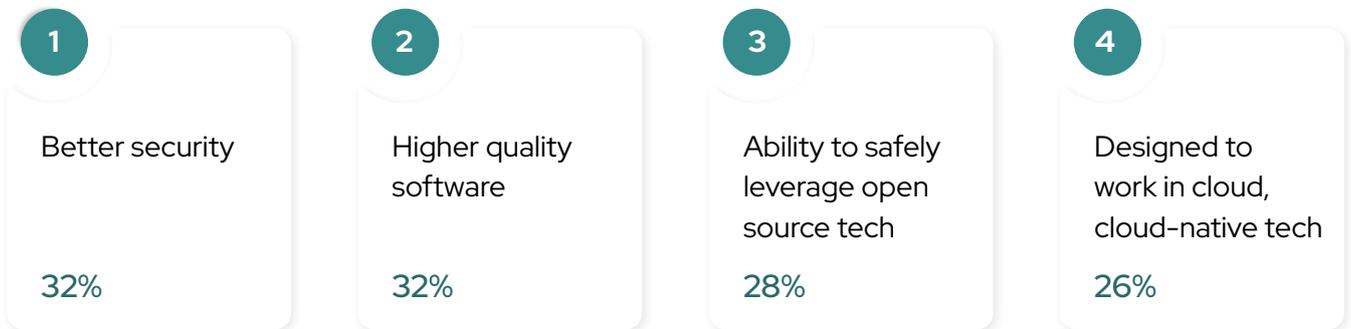
Graeme Hay

Managing Director and Distinguished Engineer,
Morgan Stanley

However, we have seen a steady shift away from enterprise open source being defined as cheaper software rather than better software. Of course, this is not to say that enterprise open source can't be less expensive to acquire and operate than proprietary software. But price is not how IT leaders generally frame their thinking about enterprise open source today.

This year's top two benefits? Better security and higher quality software. By contrast, lower TCO has declined dramatically in importance. It is now near the bottom of the benefits list in ninth place.

Top benefits of using enterprise open source



| | APAC | EMEA | LATAM | U.S. |
|--|---|---|--|---|
| | Better security— 34% | Higher quality software & Ability to safely leverage open source tech— 31% | Higher quality software— 32% | Better security— 37% |
| | Ability to safely leverage open source tech— 29% | Better security & Used by most digitally advanced companies— 28% | Better security— 31% | Higher quality software— 36% |
| | Ability to customize apps & Lower total cost of ownership— 27% | Designed to work in cloud, cloud-native tech— 26% | Designed to work in cloud, cloud-native tech— 28% | Designed to work in cloud, cloud-native tech— 27% |
| | Default choice for digital transformation— 24% | Trusted by the smartest software engineers— 25% | Ability to safely leverage open source tech— 27% | Ability to safely leverage open source tech & Used by most digitally advanced companies— 25% |
| | | | | Access to latest innovations & Total cost of ownership— 24% |



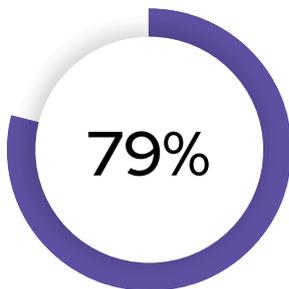
“We see open source leading the way in technology innovation and accelerating digital transformation in the region—and globally.”

Mohsin Al-Lawati

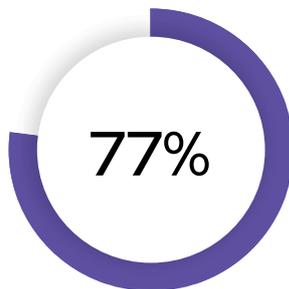
Director of Systems and Development Department,
Muscat Securities Market

Enterprise open source as a strategic asset carries over to its associated attributes identified by the survey. The story here is that the attributes are not about any single thing. Rather, they are almost uniformly positive across the board. More than 75% agreed that enterprise open source provides flexibility, ensures their organization has access to the latest innovations, has been instrumental in their organization’s ability to take advantage of hybrid cloud architectures, and is a key part of their security strategy. That covers a lot of ground.

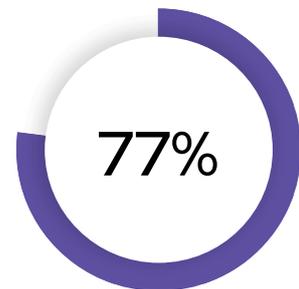
Advantages of enterprise open source



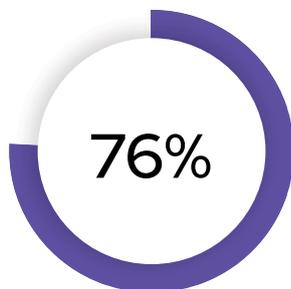
Provides flexibility to customize solutions to meet company’s needs



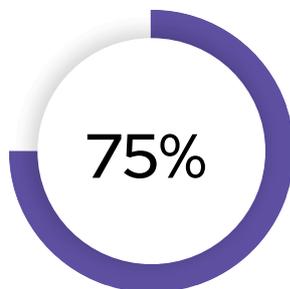
Ensures my organization has access to the latest innovations



Has been instrumental in my organization’s ability to take advantage of hybrid cloud architectures



Simplifies the process of adopting a hybrid cloud infrastructure



Is a key part of my organization’s security strategy

| APAC | EMEA | LATAM | U.S. |
|---|---|---|---|
| Ensures access to the latest innovations— 81% | Provides flexibility to customize solutions— 79% | Provides flexibility to customize solutions— 79% | Provides flexibility to customize solutions— 80% |
| Provides flexibility to customize solutions— 79% | Ensures access to the latest innovations— 78% | Instrumental in our ability to take advantage of hybrid cloud— 78% | Ensures access to the latest innovations— 79% |
| Instrumental in our ability to take advantage of hybrid cloud— 79% | Simplifies the process of adopting hybrid cloud— 75% | Simplifies the process of adopting hybrid cloud— 76% | Instrumental in our ability to take advantage of hybrid cloud— 78% |
| Simplifies the process of adopting hybrid cloud— 76% | Key part of my organization’s security strategy— 75% | Key part of my organization’s security strategy— 73% | Simplifies the process of adopting hybrid cloud— 78% |
| Key part of my organization’s security strategy— 72% | Instrumental in our ability to take advantage of hybrid cloud— 74% | Ensures access to the latest innovations— 72% | Key part of my organization’s security strategy— 76% |



About Red Hat

Red Hat is the world’s leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers develop cloud-native applications, integrate existing and new IT applications, and automate and manage complex environments. A trusted adviser to the Fortune 500, Red Hat provides award-winning support, training, and consulting services that bring the benefits of open innovation to any industry. Red Hat is a connective hub in a global network of enterprises, partners, and communities, helping organizations grow, transform, and prepare for the digital future.