The State of
Enterprise Open Source

A Red Hat® Report

When we started work on the third "The State of Enterprise Open Source: A Red Hat Report" in early 2020, we had no idea how different the world would look by the time the report was complete. Our annual report explores what's driving enterprise leaders to choose open source. This year we were also interested to see how the COVID-19 pandemic might influence the results.

As we dug into the data, not a lot surprised me. It validated much of what Red Hat already knew. 90% of IT leaders surveyed are using enterprise open source today, and they're using it for IT infrastructure modernization (64%), application development (54%), and digital transformation (53%). The move to remote working forced many organizations to accelerate their digital transformation efforts to maintain innovation and continue to meet customer demands so it makes sense that it moved up this year to the top three.

Open source has solidified itself as an innovation engine for the software industry. The technology trends that you see changing how we work and do business were born in open source—enterprise Linux®, cloud computing, edge and Internet of Things (IoT), containers, artificial intelligence and machine learning, and DevOps. These are the same principles that apply to how you've seen the world come together and make rapid advancements, like the COVID vaccine, in a shorter time frame than ever before. In both cases, enterprise technology and the challenges of a COVID world, the problems are too big for one person, one company, or one organization to solve. But it's in moments like this where open source truly shows its power. Collaboration, transparency, and the idea that the best idea can come from anywhere are the principles that help organizations not just meet challenges but reach new heights.

As you read this report, I hope that you will take away not just how organizations are using enterprise open source, but also the reasons why organizations in all industries are choosing to innovate the open source way.

Paul J. Cormier

Paul Cormier
President and CEO, Red Hat

ABOUT THIS REPORT

Commentary throughout the report is written by Gordon Haff, a technology evangelist at Red Hat. He 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.*

1,250	400	450	150	250
Total interviews were conducted with IT leaders worldwide	Completes from the United States (U.S.)	Completes from Europe, the Middle East, and Africa (EMEA)	Completes from English-speaking Asia Pacific (APAC)	Completes from Latin America (LATAM)

Respondents were unaware that Red Hat was the sponsor of this survey. Respondents had to influence purchase decisions within their organization: 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, and Mexico; Research conducted in 2020.

What is enterprise open source being used for?

For the third year in a row, "infrastructure modernization" is the top use for enterprise open source software. Furthermore, 64% now cite it as a top use, up from 53% two years ago. This continued popularity isn't really surprising. Linux and other open infrastructure like web servers have long been used to replace proprietary alternatives. One specific area of open source infrastructure that spiked in popularity this year was networking, which increased from 36% two years ago to 54% this year.

Two other uses most respondents cited may be less obvious. The second most cited use is "application development." At 54% of respondents, it has remained in second place since our first survey. This result is significant because applications are increasingly the life blood of organizations; they underpin many of the revenue-producing services delivered to customers.

"Digital transformation" ranks a close third, with 53% of respondents. Enterprise open source use for both application development and digital transformation has increased by 11 points in two years. The two are closely related because new applications are a big part of digital transformation. Taken together, they clearly demonstrate that organizations are using enterprise open source for strategic purposes, not just for infrastructure "plumbing."

90% of IT leaders are using enterprise open source today.

U.S.=91%, EMEA=88%, APAC=92%, LATAM=91%

Top ways enterprise open source is being used

1. IT infrastructure modernization **64%**
2. Application development **54%**
3. Digital transformation **53%**

U.S.	EMEA	APAC	LATAM
70% IT infrastructure modernization	**56%** Digital transformation	**69%** IT infrastructure modernization	**65%** IT infrastructure modernization
59% Application development	**56%** IT infrastructure modernization	**56%** DevOps	**53%** Digital transformation
58% DevOps	**55%** Application development	**51%** Digital transformation	**52%** Application modernization

Does your organization currently use enterprise open source solutions or technologies?
For what is your organization using enterprise open source solutions or technologies?

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Top places enterprise open source is being used

1. Networking **54%**
2. Database **53%**
3. Security **52%**

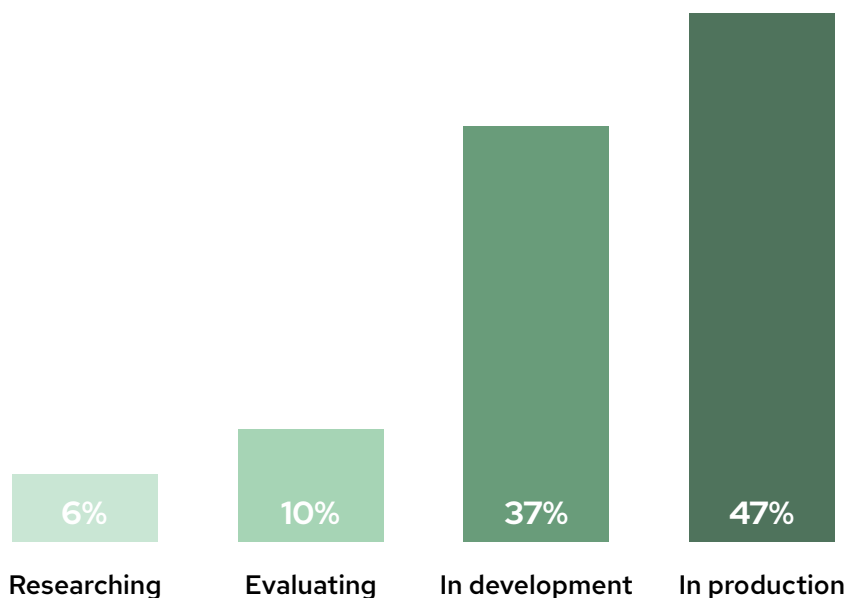| U.S.	EMEA	APAC	LATAM
55% Cloud management tools	**56%** Networking	**57%** Cloud management tools	**55%** Database
55% Networking	**54%** Database	**52%** Database	**54%** Networking
53% Big data and analytics	**52%** Security	**51%** Big data and analytics	**52%** Security

Containers and Kubernetes are key

Container adoption is already widespread; just under 50% of respondents worldwide use containers in production to at least some degree. An additional 37% use containers for development only; presumably a lot of this usage is developers using containers on their laptops. Only 16% of respondents are still only evaluating or researching container adoption.

Phases of container adoption

6%	10%	37%	47%
Researching	Evaluating	In development	In production

Where in your IT infrastructure is your organization using enterprise open source solutions or technologies?
Which of the following best describes your company's level of adoption when it comes to containers?

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Phases of container adoption

U.S.	EMEA	APAC	LATAM
51% In production	**43%** In production	**53%** In production	**45%** In production
31% In development	**43%** In development	**36%** In development	**34%** In development
10% Evaluating	**9%** Evaluating	**6%** Evaluating	**12%** Evaluating
7% Researching	**5%** Researching	**5%** Researching	**8%** Researching

> "Kubernetes has become the de facto standard for Linux container development." [1]
>
> **Michael Hinterland**
> **Team Lead, ICS Cloud & Automation and ICS System & Middleware,**
> **Porsche Informatik**

We also learned that 69% of respondents prefer to use multiple vendors for their cloud infrastructure needs. This result suggests a general preference for infrastructure that can span multiple providers rather than being limited to a single one.

Use of containers and Kubernetes is likely to continue growing. 30% of IT leaders expect to significantly increase container usage over the next 12 months. Another 42% expect to slightly increase container use. Kubernetes is overwhelmingly seen as important to cloud-native application strategies for its container orchestration: 66% of respondents view it as "very" or "extremely important," and another 19% consider it "important."
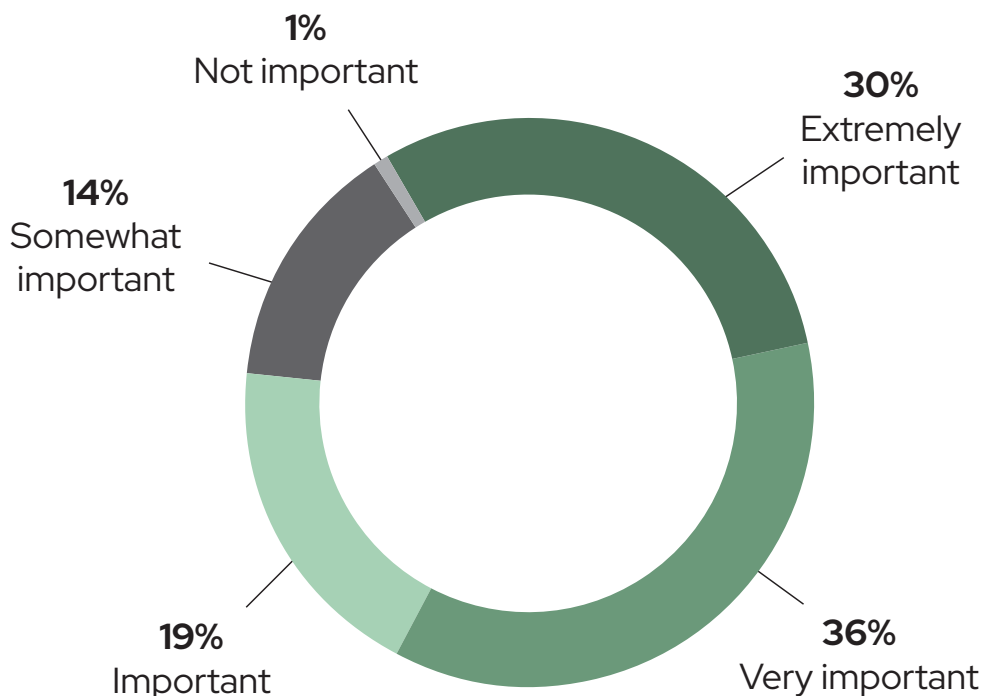
Container usage over the next 12 months

4% Decrease/ Don't know

30% Increase significantly   **42%** Increase slightly   **24%** Stay the same

U.S.	EMEA	APAC	LATAM
31% Increase significantly	**29%** Increase significantly	**36%** Increase significantly	**24%** Increase significantly
39% Increase slightly	**45%** Increase slightly	**33%** Increase slightly	**46%** Increase slightly

[1] Red Hat case study. "Porsche Informatik delivers automotive innovation faster with Red Hat OpenShift," Aug. 2020.

Do you expect your organization's use of containers to increase, decrease, or stay the same over the next 12 months?

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Importance of Kubernetes to cloud-native application strategies

1%
Not important

30%
Extremely
important

14%
Somewhat
important

19%
Important

36%
Very important

U.S.	EMEA	APAC	LATAM
36%	**31%**	**27%**	**21%**
Extremely important	Extremely important	Extremely important	Extremely important
33%	**36%**	**38%**	**41%**
Very important	Very important	Very important	Very important
18%	**20%**	**18%**	**21%**
Important	Important	Important	Important

There's little doubt that infrastructure based on containers and Kubernetes is the foundation of a new wave of application development—and is key to digital transformation.

That said, there is variation by industry. Among the industries we examined separately, telecommunications was leading with 81% expecting to increase their container usage over the next 12 months and 94% saying that Kubernetes is important to their cloud-native application strategies. The financial services and retail industries were closer to the overall averages of 72% on increased container use and 85% on the importance of Kubernetes. Healthcare trailed with a more modest 62% planning to increase container usage, and 66% judging Kubernetes as strategically important.

Container adoption varies by industry

Financial services

62%	In production
28%	In development
7%	Evaluating
4%	Researching

Healthcare

47%	In production
45%	In development
3%	Evaluating
5%	Researching

Telecommunications

62%	In production
22%	In development
7%	Evaluating
8%	Researching

Retail

50%	In production
36%	In development
12%	Evaluating
2%	Researching
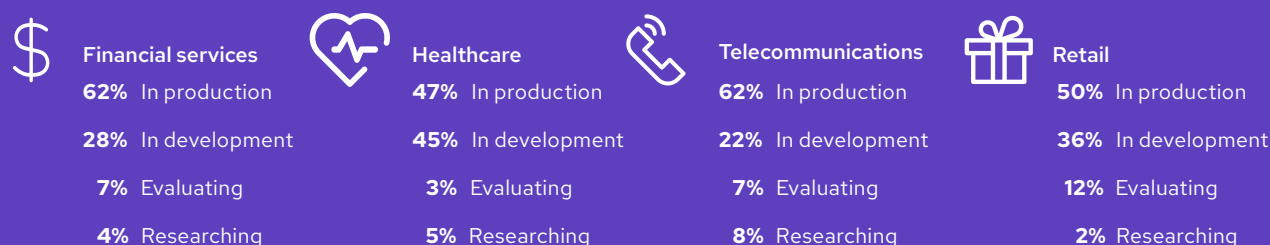
Security is a top benefit

Perceptions of enterprise open source software security and its role in risk mitigation continue to improve. When ranking the respondents' top identified benefits of enterprise open source, "Better security" takes third. But consider that "higher quality software" comes in first, and "safely leverage open source tech" ranks fourth. Like security, these are all relevant to organizations looking to reduce risk associated with software. Importantly, the percentage of respondents citing these three benefits have all risen since we first asked the question two years ago.

Overall, 87% see enterprise open source as "more secure" or "as secure" as proprietary software.

We also asked some new questions to gauge attitudes about enterprise open source. Here, the results pertaining to risk management are even more striking. 84% indicate that enterprise open source "is a key part of my organization's security strategy." 75% trust enterprise open source because it undergoes "[...] a stringent vetting process and commercial testing to ensure quality code." The processes associated with enterprise open source specifically are also reflected in the 55% majority who say that enterprise open source is more secure than community-based open source. As a side note, it's also encouraging to see the number of IT leaders highlighting security, code quality, and trusted sourcing.

One reason we see this emphasis on security—and risk more broadly—is that attacks only seem to get more frequent and threatening. But respondents seem to place trust in the security of open source software to help handle these threats, with 83% using enterprise open source in production.

Top benefits of using enterprise open source

1. Higher quality software **35%**
2. Access to latest innovations **33%**
3. Better security **30%**
4. Ability to safely leverage open source technologies **30%**

Which of the following best describes your company's level of adoption when it comes to containers?
What would you consider to be the top three benefits of using enterprise open source solutions or technologies?

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U.S.

35%
Higher quality software

33%
Access to latest innovations

32%
Ability to safely leverage open source technologies

EMEA

35%
Higher quality software

33%
Access to latest innovations

31%
Better security

APAC

38%
Higher quality software

33%
Access to latest innovations

30%
Trusted by smartest software engineers

30%
Ability to safely leverage open source technologies

LATAM

35%
Better security

34%
Higher quality software

32%
Ability to safely leverage open source technologies

84% say that enterprise open source is a key part of their organization's security strategy.

U.S.=83%, EMEA=86%, APAC=87%, LATAM=83%

Some barriers remain

The barriers to enterprise open source adoption haven't shifted much since we first started running this survey. The same barriers still take the top four slots: concerns about level of support, compatibility, code security, and lack of internal skills. This year, concerns about security dropped from first to third, and support rose to take its place. However, the total number of respondents citing concerns hasn't shifted much.

To some degree, these concerns probably aren't so much about enterprise open source as they are about the use, integration, and self-support of community projects. The two are often conflated. However, they're also concerns and complaints commonly heard about software generally, especially in fast-moving technology areas. In any case, they highlight the importance of trusted software supply chains, technology partners, and keeping workforce skills up to date.

Perceived barriers to using enterprise open source

1. Level of support **42%**
2. Compatibility **38%**
3. Security of the code **35%**
4. Lack of internal skills **35%**

How much do you agree that enterprise open source is a key part of my organization's security strategy? (completely/somewhat agree)
What would you consider to be the top three barriers to using the enterprise open source solutions or technologies?

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Perceived barriers to using enterprise open source

U.S.	EMEA	APAC	LATAM
40%	**47%**	**42%**	**44%**
Compatibility	Level of support	Security of the code	Compatibility
39%	**36%**	**37%**	**43%**
Level of support	Compatibility	Lack of internal skills	Level of support
35%	**32%**	**37%**	**40%**
Lack of internal skills	Lack of internal skills	Level of support	Lack of internal skills
35%	**32%**	**29%**	**39%**
Security of the code	Security of the code	The software we use is good enough	Security of the code

Enterprise open source for innovation

Over the course of the last decade, perception of enterprise open source has gone from being about lower software bills to now being about flexibility and access to innovation. And this change appears to be accelerating. It's not that enterprise open source doesn't still deliver good value. But as time goes on, cost is falling behind as a primary reason organizations consider open source software.

Consider the following findings from our survey:

Two years ago, lower cost of ownership was cited as the top benefit of enterprise open source. This year, it's fallen to the sixth spot, well below "access to the latest innovations" in second. This year, 82% of IT leaders also agreed with the statement that "enterprise open source is used by the most innovative companies." About the same number, 81%, said that it "provides flexibility to customize solutions to meet company needs."

We see specific examples of enterprise open source adoption in emerging technology areas. 79% of respondents expect that over the next two years, their organization will increase use of enterprise open source software for emerging technologies. In the two most prevalent emerging tech areas, edge computing/IoT and artificial intelligence/machine learning (AI/ML), use of enterprise open source is expected to significantly outpace proprietary software over the same period. In edge computing/IoT, enterprise open source is expected to increase from 55% of cases to 72% two years from now. And, for AI/ML, our survey found that proprietary software use is actually expected to decrease, while enterprise open source use shoots up from 48% to 65%.
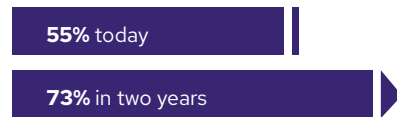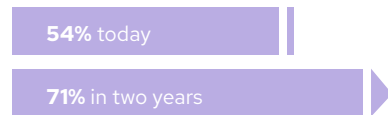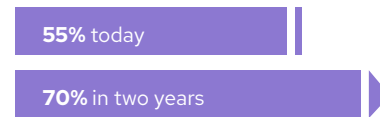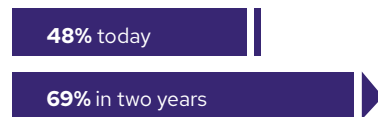
Use of enterprise open source in emerging technologies

Edge computing / IoT

Today	**55%**
In two years	**72%**

Artificial intelligence / machine learning

Today	**48%**
In two years	**65%**

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What types of software does your company use for each of these emerging technologies today?
What types of software does your company expect to use for each of these emerging technologies two years from now?

Edge computing / IoT

U.S.

55% today

73% in two years

APAC

54% today

71% in two years

EMEA

55% today

70% in two years

LATAM

58% today

74% in two years

Artificial intelligence / machine learning

U.S.

48% today

69% in two years

APAC

51% today

68% in two years

EMEA

45% today

62% in two years

LATAM

50% today

65% in two years
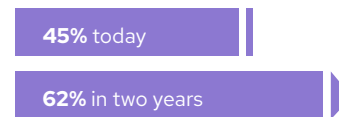
> **83% of IT leaders are more likely to select a vendor who contributes to the open source community.**
>
> U.S.=80%, EMEA=83%, APAC=87%, LATAM=88%

Contribution matters

It's helpful to track the changes in the use of and attitudes about enterprise open source over time, so we keep most questions the same from year to year for consistency. However, we also work in a few new questions—whether to reflect the increasing importance of an emerging technology area like AI/ML, or just to ask a question we've never explicitly studied in the past.

This year, we decided to ask this new question: "When deciding on a software vendor, what impact does knowing that they contribute to the open source community have on your decision?" The question of whether large consumers of open source contribute sufficiently to the software they use has been something of a hot topic of late—especially as a facet of open source sustainability and whether many large companies are doing their fair share. Working within upstream communities is also good for the contributor, helping them develop expertise and influence for the benefit of customers—which is presumably what IT leaders most care about.

When deciding on a software vendor, what impact does knowing that they contribute to the open source community have on your decision? (much/somewhat more likely to select)

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"We could not do this alone. This is about partnership—the open source community is absolutely critical - our other government teammates as well. We want to take advantage of what they've already learned, and we want to share what we've learned." [2]

Dr. Lisa Costa
Director, C4I & CIO,
Special Operations Command, Department of Defense

The answer to that question surprised us. The IT leaders who took our survey not only care; they care a lot. 38% are "much more likely" to select a vendor who contributes, and 45% are "somewhat more likely" to do so. We've always known working in upstream projects is not just the right thing to do—it's the best approach to open source software development and the best way to deliver open source benefits to our customers. It's great to see that IT leaders recognize this as well.

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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.

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