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Achieving Intelligent DevOps

How Open Source Software and Linux Fit into Today's DevOps and Digital Business Initiatives

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About this paper

A Pathfinder paper navigates decision-makers through the issues surrounding a specific technology or business case, explores the business value of adoption, and recommends the range of considerations and concrete next steps in the decision-making process.

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Jay Lyman is a Principal Analyst with 451 Research's Applied Infrastructure & DevOps Channel. He covers infrastructure software, primarily private cloud platforms, cloud management and enterprise use cases that center on orchestration, the confluence of software development and IT operations known as DevOps, Docker and containers. Jay's analysis encompasses evolving IT operations and software release models, as well as the technology used to create, deploy and support infrastructure and applications in today's enterprise and service-provider markets. Key areas of research also include OpenStack, PaaS and enterprise end users.

Executive Summary

Today's business organizations face immense challenges in effectively leveraging technology platforms, tools and teams in order to compete and innovate. It is becoming increasingly clear that those companies unable to achieve agility and digital transformation are more likely to be left behind. Open source software and Linux can help. The modularity, componentization and flexibility of open source make it a match as the platform for today's DevOps and cloud-native infrastructure and applications. Linux and cloud-native software can help provide consistency, stability and scalability. Still, to successfully implement open source Linux and cloud-native technology, organizations need to balance key factors such as security, supportability and total cost of ownership (TCO).

The ability to support application portfolios across hybrid and multicloud infrastructures that include on-premises, private cloud and multiple public cloud environments is also key to digital transformation. By taking advantage of Linux's efficiency and management automation, organizations can also enable more efficient IT operations and use of the right environments for the right applications.

In addition to enabling greater focus on innovation and remaining competitive, open source software, Linux and cloud-native technology can help organizations transform their tactical operations to achieve a more effective, strategic approach. Analytics and management automation can enable more proactive, continuous assessment of systems rather than reactive checks, which are typical when a problem (e.g., an outage) is manifesting. This can help organizations to resolve potential issues before they impact business operations, thus achieving more intelligent DevOps.

Key Findings

- Open source software such as Linux and cloud-native components are a priority for today's enterprise (see Figure 1). Open source is also a critical part of emergent trends including faster release cycles, more efficient IT operations based on DevOps approaches, and increased portability and scalability that is expected for cloud-native and other applications. This makes open source a necessity to compete in today's market.
- Organizations must also be able to leverage a 'best execution venue' approach whereby applications run on the most appropriate infrastructure based on cost, performance and time to value offered by different environments, including on-premises, private clouds and multiple public clouds.
- To effectively implement and scale open source software for larger infrastructures and application portfolios, organizations need management and support capabilities that cover governance, security, reliability, performance and production use, as well as effective commercial backing.
- Another key consideration is the total cost of ownership of IT systems and software with a particular focus on lower staffing costs while still managing larger-scale systems and cloud services with the right tooling and vendor support.
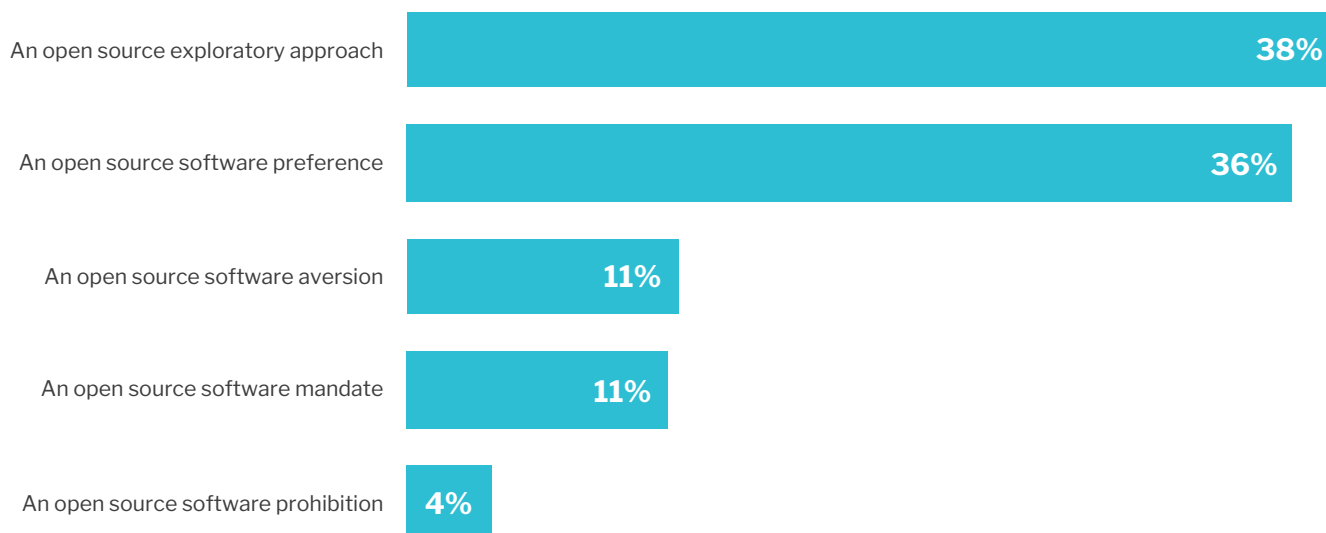
- Companies must also leverage platforms with management analytics and automation built in to improve observability and more efficiently resolve issues – for example using routine analysis to remediate security and operational risk at scale. This enables more effective applications and more efficient IT operations. Easier day-to-day maintenance in turn frees up time to address and achieve intelligent DevOps, digital transformation and customer satisfaction.

Figure 1: Open source mandate or preference favored

Source: 451 Research's Voice of the Enterprise: DevOps H2 2019
Q: What is your organization's attitude toward open source software?
Base: All respondents (n=484)

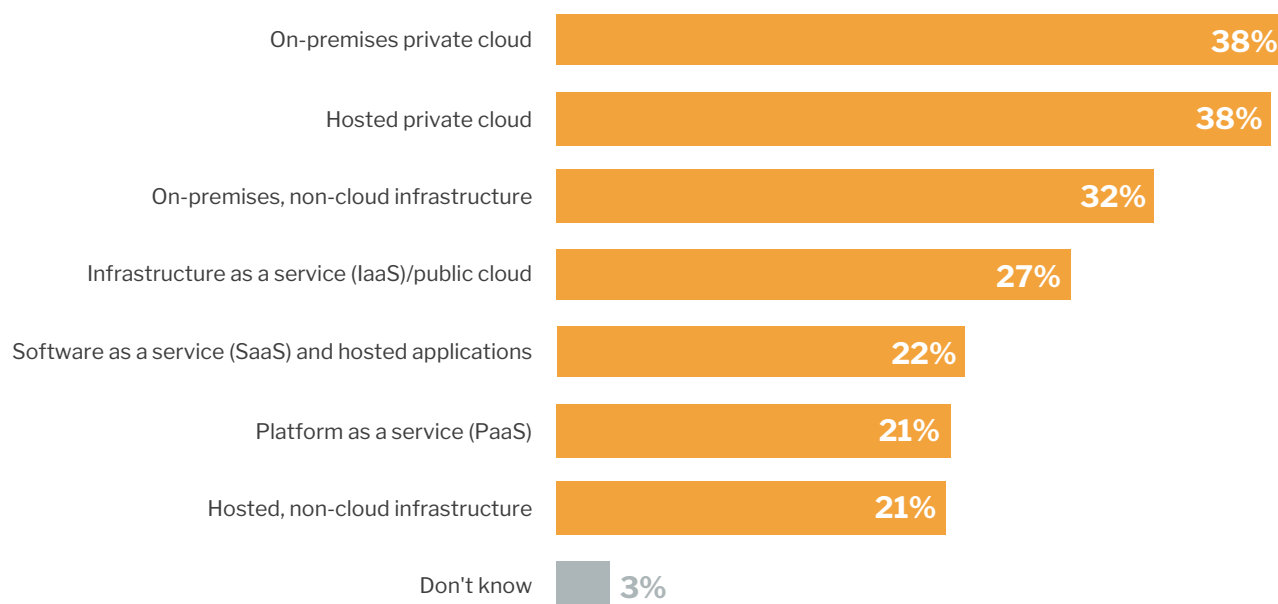|	
An open source exploratory approach	38%
An open source software preference	36%
An open source software aversion	11%
An open source software mandate	11%
An open source software prohibition	4%

Why Open Source and Linux?

Open source software such as Linux and cloud-native components can enable and enhance productivity by providing modular components that can be more easily integrated, and by supporting the stability, scalability and security required by today's businesses. Open source Linux is also well positioned to consistently and centrally support enterprise applications across hybrid and multicloud infrastructures that may include on-premises, private cloud and multiple public cloud environments. While a single application typically does not draw on the services and capabilities of multiple environments, there are advantages to supporting hybrid and multicloud infrastructures for different applications across the portfolio of applications. Linux is often the single, consistent platform across these hybrid infrastructures. Our research indicates a variety of different infrastructures are being used for DevOps implementations (see Figure 2).

Figure 2: A variety of deployment venues for DevOps
Source: 451 Research's Voice of the Enterprise: DevOps H2 2019
Q: Which environment does your organization use for your DevOps implementation (Check all that apply.)
Base: All respondents (n=491)

Venue	Percentage
On-premises private cloud	38%
Hosted private cloud	38%
On-premises, non-cloud infrastructure	32%
Infrastructure as a service (IaaS)/public cloud	27%
Software as a service (SaaS) and hosted applications	22%
Platform as a service (PaaS)	21%
Hosted, non-cloud infrastructure	21%
Don't know	3%

Most DevOps is happening on-premises and in private clouds today, yet we also see growing interest in SaaS, managed services and public cloud. This highlights the need for a 'best execution venue' approach with a platform that is flexible enough to support needs no matter where applications are deployed. **Open source software, including Linux, has proven to be ideal for hybrid and multicloud because of its deployment flexibility.** What is also needed is management tooling across all these venues to realize intelligent DevOps. As organizations pursue this 'best execution venue' approach, they can leverage the modularity, flexibility, consistency and other advantages of open source Linux.

Security Management Considerations for Linux

As part of the ongoing evolution of the DevSecOps trend, companies also need to integrate security elements into their application development, deployment and operations processes. There has been a significant change in the market whereby IT teams are less likely to see security as a hindrance and are more likely to accept the idea that security should be integrated and risk should be reduced.
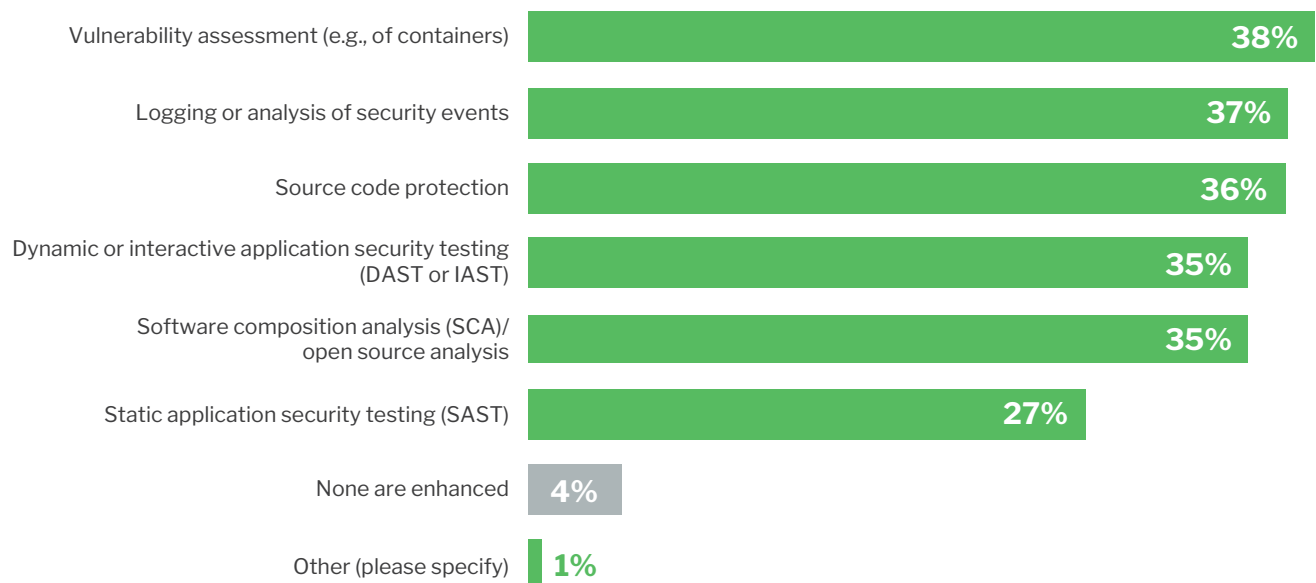
We've also seen improved integration and automation of security tools so that they do not interfere or slow down the processes but improve software quality and the resilience of systems and applications. High-profile security vulnerabilities and breaches are also driving a greater priority on securing application development and deployment pipelines, as well as ongoing operations. For example, when a risk is identified, it must be resolved quickly across a series of deployments, and this is where management automation solutions can help. Thus, organizations are increasingly including security elements, such as vulnerability and compliance assessments, as well as different forms of application security testing into their DevOps releases (see Figure 3).

Figure 3: Security elements increasingly critical to DevOps releases
Source: 451 Research's Voice of the Enterprise: DevOps H2 2019
What is the most critical security element to your DevOps workflows?
Base: All respondents (n=469)

Security element	Percentage
Vulnerability assessment (e.g., of containers)	38%
Logging or analysis of security events	37%
Source code protection	36%
Dynamic or interactive application security testing (DAST or IAST)	35%
Software composition analysis (SCA)/ open source analysis	35%
Static application security testing (SAST)	27%
None are enhanced	4%
Other (please specify)	1%

These security elements are only part of the picture. It's important for companies today not only to keep up with security vulnerabilities, but also to harden infrastructure and applications proactively, which helps reduce demands placed upon security teams as well as decrease overall risk. Another important aspect of the DevSecOps trend is having observability into systems and applications in use with policy rules and governance that can scale up with deployments.

Operational Efficiency with Linux

It's imperative for organizations to drive efficiencies in their development and IT operations to successfully achieve intelligent DevOps and digital transformation. **Open source software such as Linux and cloud-native components can help organizations manage larger-scale infrastructures with smaller IT operations teams** by abstracting and automating many of the low-level tasks that take up development and administration time, including automated resolution of identified issues.

Our research indicates efficiency is a top benefit of DevOps releases (see Figure 4). While DevOps has always been about faster software releases, our research highlights how other factors – including efficiency, flexibility to quickly respond to changes, reduced cost of rework, and enhanced teamwork – are also important.

Figure 4: Efficiency, flexibility, speed are top DevOps benefits
Source: 451 Research's Voice of the Enterprise: DevOps H2 2019
Q: How is a DevOps approach benefiting your organization? (Check all that apply.)
Base: All respondents (n=486)

More efficient use of personnel	43%
Flexibility to quickly respond to changes	38%
Faster software releases	37%
Reduces costs of rework	32%
Enhances teamwork	32%
Flexibility to layer tools into the development process	30%
Decreases costs of deployment	28%
The market demands continuous updates	27%
Other (please specify)	0.4%
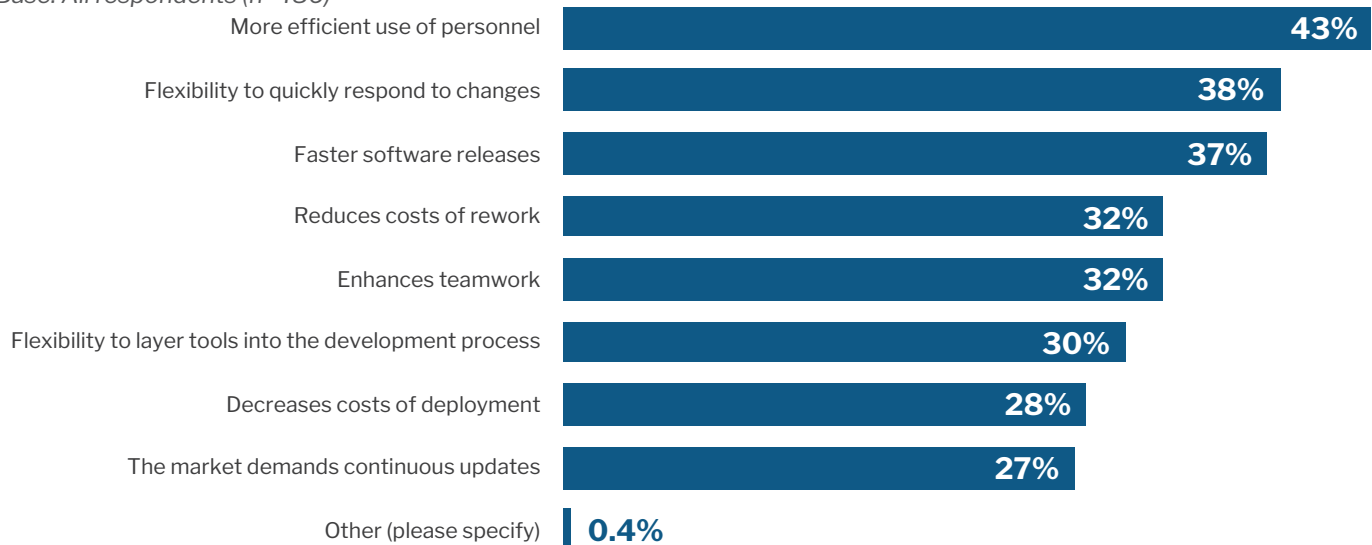
Organizations must also strive to become proactive rather than reactive so they can move beyond firefighting and triage mode to find and resolve potential issues before they impact business operations. A proactive stance also has significant security and compliance advantages – vulnerabilities can be found earlier in the process, and troubleshooting can be streamlined to more quickly find and resolve issues.

Intelligent DevOps also requires smart platforms with key management and administration features that address operational efficiency, easier issue resolution, and maintainability across hybrid and multicloud deployments. Hardening for reliability, performance and security is also important. Finally, organizations must have consistency, observability and flexibility across development and production environments.

From TCO to ROI

When considering the TCO of open source software such as Linux and cloud-native components, organizations must consider the staff and resources required to adequately support them. While open source software delivers cost savings and efficiency by avoiding proprietary licensing royalties, it may require more skills and staff to support, which may add to costs.
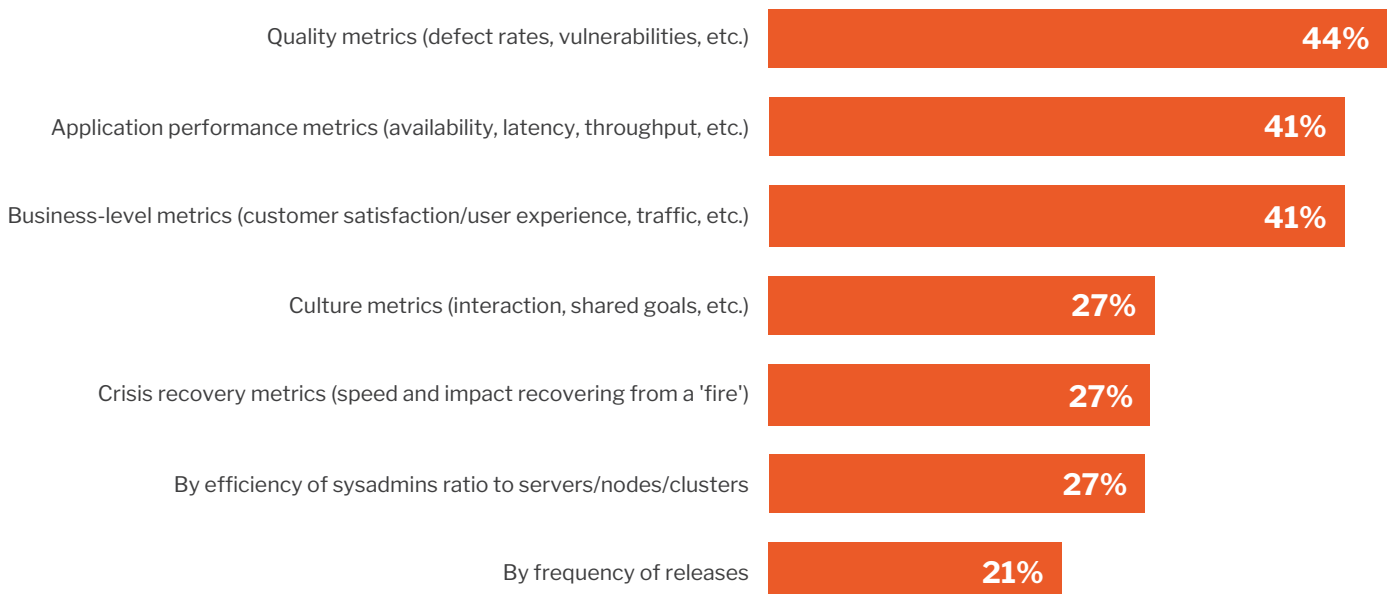
This is part of the reason we see organizations increasingly leveraging SaaS, managed services and intelligent platforms. With features and capabilities around IT analytics and automation, software such as Linux can better position organizations to take advantage of cloud infrastructure, especially when management productivity tooling can be integrated. Our research also indicates companies are measuring DevOps success in terms of technical metrics such as quality and performance, as well as business metrics such as customer satisfaction (see Figure 5).

Figure 5: Measuring both technical and business metrics for DevOps success
Source: 451 Research's Voice of the Enterprise: DevOps H2 2019
Q: How do you measure/prove the business value of DevOps implementations (Select all that apply.)
Base: All respondents (n=475)

Quality metrics (defect rates, vulnerabilities, etc.)	44%
Application performance metrics (availability, latency, throughput, etc.)	41%
Business-level metrics (customer satisfaction/user experience, traffic, etc.)	41%
Culture metrics (interaction, shared goals, etc.)	27%
Crisis recovery metrics (speed and impact recovering from a 'fire')	27%
By efficiency of sysadmins ratio to servers/nodes/clusters	27%
By frequency of releases	21%

The DevOps trend has matured and evolved in the industry and now includes more top-down adoption and involvement of management and leadership rather than just the grassroots developer movement when it began a decade ago. Today's organizations are much less likely to view application development and IT operations simply as a cost-loss center and more likely to see them as value generators. Thus, we see companies moving beyond thinking just about TCO and becoming increasingly focused on return on investment.

Conclusion and Outlook

Linux and cloud-native use cases can serve as examples for today's organizations to effectively leverage open source software to achieve intelligent DevOps and digital transformation. One such use case centers on uptime and efficiency. DevOps means not only developers and IT operations teams collaborating, but also the involvement of data analytics teams, security teams, management and executive leadership. Management automation is required to alleviate the burdens of IT operations maintenance so teams can focus on delivering new features, products and capabilities. DevOps is also about the ability to manage large-scale infrastructure with smaller teams while still maintaining uptime, which has consistently been a critical need for organizations. At the same time, by identifying and prioritizing risks and patches, intelligent DevOps can help organizations get away from a cycle of reactive management to be more proactive in quickly finding and resolving IT operations issues.

Another key use case where open source Linux and cloud-native technology play a role involves the evolving DevSecOps trend, whereby security elements and tools are increasingly integrated into application development and IT operations. In addition to running on a hardened platform, IT infrastructure systems must be continuously monitored for better reliability, performance and security. Intelligent DevOps also means that security teams have a seat at the table, which can help organizations be more responsive and strategic in their IT operations mandates and priorities.

Intelligent DevOps is a hallmark of effectively using hybrid and multicloud infrastructures for applications. This means a 'best execution venue' approach whereby organizations can consistently and confidently deploy applications on-premises, on private clouds or in multiple public clouds depending on cost, performance, data sovereignty, geographic location and other factors. They can also have a consistent platform and set of management tools across all deployment environments. We see open source, Linux and cloud-native software playing a prominent role in data analytics use cases. By collecting and analyzing data about infrastructure systems and software applications, organizations can better measure the success of their operations. This includes considering both technical metrics such as quality and application performance and business metrics such as customer satisfaction. Also critical is effectively collecting and analyzing data (such as broad security information), then prioritizing the data that matters while cutting down on data 'noise' from information that may not apply.

Operational efficiency, TCO considerations and the need for business transformation are often competing priorities within organizations. This is another place where the right platforms, management, tooling and support can help teams prioritize and work together to achieve digital transformation and intelligent DevOps, which means using more proactive processes for maintenance and configuration so there is more time to spend on new features, products and innovation.

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