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- Oregon Department of Transportation
- Department of Defense Army Research Lab



Open Source Special Report: Separating Fact From Fiction

Lore and Merit

Putting the misconceptions to rest and realizing the big benefits of open source

Like any other revolutionary technology, open source carries with it a number of myths and underaccepted truths. Separating open source fact from fiction can mean dramatically enhanced services and millions in cost savings.

For governments of all sizes and at all levels, debunking the myths of open source and realizing the benefits of this revolutionary approach may be vital in the age of always-on e-government. Understanding what open source can do for government is imperative to agencies and organizations that wish to do more than merely exist as a budgetary expense. Here are the facts about open source:

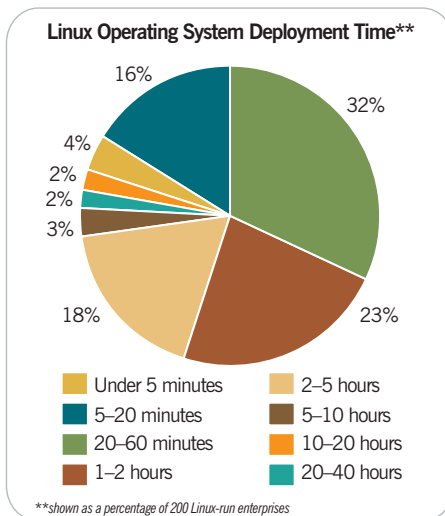
Fact: Open source is secure.

A common response to the question of why open source technology is less vulnerable to security breaches is that the leading proprietary software is used more widely than open source software, such as Linux*. The logic goes that open source is such a small target when compared to proprietary technology that would-be attackers simply don't bother trying to break into open source systems.

However, according to a study conducted by NetCraft — an Internet data research and analysis group — 47 of the top 50 Web sites run on Apache, preeminent Web-server technology that happens to be open source.

If hackers based their attacks solely on which technology is most widely used, there should be a huge number of worms, viruses and the like infecting Apache Web servers. But Apache servers demonstrate the longest uptimes by considerable margin compared to proprietary-technology-based servers — one Web site NetCraft notes is approaching 1,800 days of uptime.

The simple truth is that there are far fewer attacks on open source systems because they are more secure, thanks in large part to the vast



Source: Get the Truth on Linux Management, Enterprise Management Associates, February 2006



47 of the top 50 Web sites run on open source servers.

number of users examining code and the rapidity with which patches are made available for breaches.

Fact: There is strength in numbers.

It seems counterintuitive that easily obtainable source code would be more secure but, in fact, it is. Because so many people can — and do — look at the source code, open source is a more secure technology. Open source software does not rely on a small — or even a large — department within a corporation to provide patches to vulnerabilities. Open source relies on thousands of programmers from different backgrounds to combat malicious elements.

Since open source code can be altered by the user, open source software can be designed to specifically suit an agency's needs. System administrators can monitor who accesses source code and what they do with it. With so many eyes looking at the source code, vulnerabilities are identified and patches are created and distributed much more quickly than is done with proprietary software.

But what truly makes open source more secure is its modular design. For example, when a graphics program is running on Linux, the software has

Did You Know?

Open source significantly reduces technology costs.

Government agencies that use open source report average savings of 40 percent to 50 percent on hardware expenses while software costs are being driven down by as much as 40 percent. According to a July 2005 Study by the Robert Francis Group, Linux provides savings of 40 percent over UNIX and 34 percent over Microsoft.

Open source is more reliable than proprietary software.

With an entire community of programmers and organizations — such as Novell — focused on securing and improving open source code, bugs and vulnerabilities are caught and fixed more quickly than with proprietary systems that rely on a small number of programmers to send out patches.

Open source is used by a wide range of corporations and government agencies.

Agencies at every level of government, including the Department of Defense, the Oregon Department of Transportation and numerous local governments, use Linux. Open source is supported by virtually all major application vendors.

Open source is easier and cheaper to deploy and operate.

In a February 2006 Enterprise Management Associates survey of 200 Linux-run enterprises, 95 percent of respondents said they spent less than half an hour per week managing viruses and spyware. Nearly 90 percent reported they spent less than 30 minutes on patch management for servers.



Case Study

Maximizing Resources

Building a Linux foundation for smoother operations: Jefferson County, Colo.

The Jefferson County government provides services for 530,000 citizens in a thriving community in the Denver-Aurora metro area of Colorado. The county has nearly 3,500 employees across 46 locations.

Like most government offices, Jefferson County is interested in using taxpayer dollars wisely and making the most of its limited IT budget. Managing hardware and software costs was a key reason the county began running Linux* and several open source applications. A longtime Novell® customer, the county wanted the same kind of user management and network services on Linux as it was accustomed to with NetWare®.

As both a Linux and NetWare user, Jefferson County found the right fit with SUSE® Linux Enterprise Server to replace Red Hat*. The county also has plans to move to Novell Open Enterprise Server to leverage directory and network services on Linux.

“Novell is doing just the right things with Linux,” said Steve O’Brien, director of IT Operations for Jefferson County. “We plan to consolidate most everything to Novell Open Enterprise Server and reduce the costs of buying big, expensive servers. In a few years, we plan to be 100 percent Linux with our Novell products.”

Jefferson County aims to run many of its core applications on SUSE Linux Enterprise Server 9, including its Electronic Data Management System, Remedy and Oracle* applications. The county also has several large PostgreSQL databases, one with 23 million records that currently run on Linux.

“We like open standards, and the security is so much better with Linux,” said O’Brien. “As a government agency with a lot of homeland-security and law-enforcement work, we take security very seriously. We also see a huge difference in uptime with Linux. Some of our Linux servers have been up for three years, while many of our Windows servers require weekly reboots.”

Today, Novell eDirectory™ is the foundation of the county’s infrastructure, providing a single repository for user identity information. Developers tie all applications that require authentication to eDirectory for centralized user authentication. With the cross-platform capabilities of eDirectory, users can access applications regardless of platform — HP-UX*, Linux or Microsoft Windows.

“Because Novell Open Enterprise Server delivers NetWare services to the Linux platform, we can continue to take advantage of Novell’s superior networking services even as we deploy Linux to take advantage of lower hardware requirements and high security and availability,” said O’Brien.

For example, the county has used Novell iPrint extensively. Novell iPrint simplifies printing by giving users a graphical map of the printers in their areas. Clicking on the printer icon automatically downloads the correct printer driver.

“Novell iPrint is an absolutely golden product,” said O’Brien. “Our users can print in seconds to any printer on our network, and our help desk loves it because it frees them up from printing problems.”

Another network service, Novell iFolder®, gives users secure remote access to files whether they are working from home, from another office or while they’re traveling. Using a standard Web browser, users can access files using any computer. Novell iFolder also provides solid disaster recovery to protect valuable information.

The county selected Novell GroupWise® over Microsoft Exchange for collaboration and is running the GroupWise Linux client on SUSE Linux Enterprise Server. GroupWise Messenger provides secure instant messaging among county users and integrates with Gaim running on Linux.

“GroupWise is head and shoulders above Microsoft Exchange,” said O’Brien. “My peers at other organizations describe problems with their Exchange e-mail systems that I don’t even think about. And now that GroupWise is supported on Linux, we will enjoy additional savings on collaboration.”

Moving to Linux has helped Jefferson County reduce its hardware costs by 50 percent since it replaced its large UNIX servers with Intel* hardware. The county has reduced its software costs nearly 30 percent with open source products.

Integrating applications with eDirectory has also helped the county reduce user administration time by 30 percent. Moving to Novell Open Enterprise Server will allow the county to consolidate to a single operating platform for further cost savings.

“By implementing Linux and open source solutions from Novell, we reduced our hardware costs by 50 percent, software costs by 30 percent and administration costs by 30 percent — all while improving uptime and overall security,” said O’Brien. “We like that. We like the freedom we get with Novell.”

access only to directly related applications, files and directories — not to the entire operating system. That way, if a viral image is loaded into the graphics program, the virus can affect only the immediate files running the program; it cannot travel to the rest of the system.

On the other hand, proprietary systems like Windows* grant users (or hackers) access to every file on the system, regardless of what program is being used to access them. Thus, opening an infected image file in Microsoft* Paint can easily damage the entire operating system — or spread to the network.

Fact: Open source systems are widespread.

Open source already runs a significant number of mission-critical systems. In state government, 47 of the 50 states currently run open source technology like SUSE® Linux. Some states, such as Massachusetts, are moving toward exclusive use of open source technology in their operations. Moreover, large federal government organizations, such as the Department of Defense, the Department of Energy and the Government Accountability Office, have implemented an open source strategy.

A study conducted in 2005 by Optaros — an open source consulting and integration firm — noted that more than 50 percent of the U.S. government agencies it surveyed were using at least some open source software, with databases and application servers being chief among them.

Furthermore, open source applications are proving themselves in a wide array of international deployments.

In the Czech Republic, for example, the government relies on APOST, a customized system used by all 20,000 postal employees. To upgrade performance and reliability, Czech Post moved to a SUSE Linux Enterprise Server operating system. The transition and rollout happened with zero downtime. And with the system up and running, APOST boasts nearly 100 percent uptime.

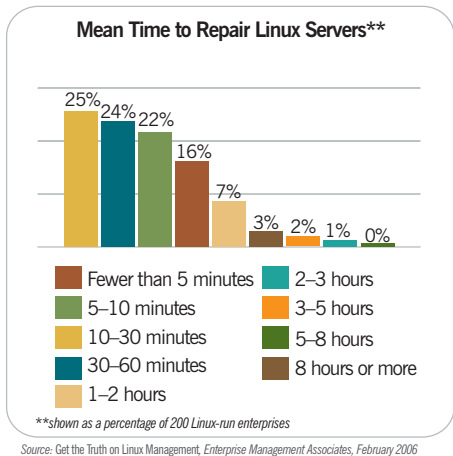


In the U.S., 47 states currently run open source technology.

Fact: Technical support for open source is abundant.

Open source vendors like Novell® have developed extensive, worldwide support structures. Novell customers can turn to more than 700 support technicians across the globe who are available 24 hours a day, seven days a week.

In fact, open source inherently presents much more support than traditional, proprietary technology. There is an entire community of open source users who can quickly discover, isolate and repair bugs in an application. This community does not have to work around corporate bureaucracy and red tape to get a patch out. Instead, they simply fix the problem, and the solution is usually free.



Two: Open source tools are readily available.

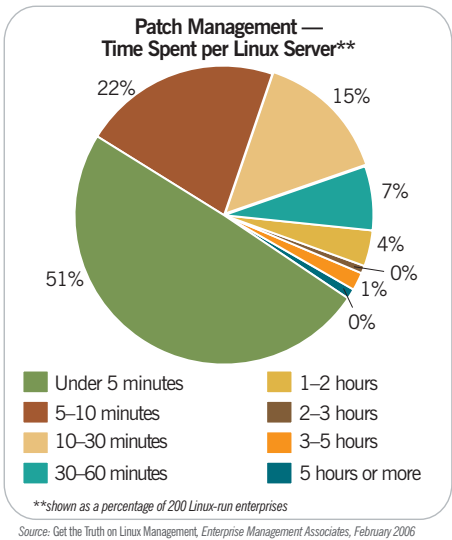
Recently Oregon's Driver and Motor Vehicle Services (DMV), part of the Department of Transportation, reached a point where it had to upgrade its IT infrastructure. The agency initially opted to replace its old UNIX* systems with more modern UNIX systems. After evaluating its options, however, the DMV switched to Linux. The result was a brand-new system that was up and running in 80 hours. In addition, the DMV experienced more uptime and better functionality, all at a significantly lower cost.

The DMV found that open source tools were readily available, and it avoided the inflexible and expensive licensing requirements that often accompany proprietary software. Open source users have tools available to them not only from vendors like Novell but also from the whole open source community.

Additionally, open source permits governments to embark on shared application development. In the public sector, this point is sharpened by the fact that governments are not intended to compete but solely to serve citizens. With so many agencies doing virtually identical tasks, it's just common sense to develop systems for common use.

Three: Open source provides the security government agencies need.

Open source is proven to be more secure than proprietary technology. Consider the incredible adoption rate of Mozilla's Firefox* Web browser: When Firefox version 1.5 was released in November 2005, it was downloaded more than 2 million times in two days. The reason is the open source browser is proving itself much more secure than Internet Explorer.



And that's typical. An Enterprise Management Associates study from February 2006 showed that 89 percent of open source users reported 99.95 percent uptime. Only 2.5 percent reported less than 98 percent availability.

Fact: Open source is supported by application vendors.

Linux and open source have been so widely adopted that application vendors had to port their applications to Linux. In fact, it would be difficult to find a mainstay application that does not run on Linux systems.

Making the Switch

The core of the issue is what's in it for government that merits the switch. Here are five reasons to consider an open source strategy:

One: Open source is easy to deploy and operate.

There's no denying e-government is becoming more vital to agency success. Whether that means internal solutions for employees or intelligently simple Web portals for the public, to survive in the coming era, government must adopt and implement e-government services.

With open source, agencies can offer the easy-to-use e-government services constituents demand because open source itself is easy. As previously mentioned, server maintenance is dramatically easier with open source than with proprietary technology. Imagine an agency whose servers went years without crashing instead of months.

Agencies will also find that problems are easily patched, and such patches are typically made available much more quickly than they might be through a proprietary vendor. Easy patching means better service for constituents and lower costs for government.

Quick repair times and greatly reduced downtime mean open source can help government agencies avoid the chaos that ensues when proprietary systems crash and need rebooting.

In February, Danish computer security firm Secunia — well known for tracking software and operating system vulnerabilities — released a report comparing unpatched Firefox 1.x to unpatched Internet Explorer. Firefox was found to

have two vulnerabilities, the worst of which was identified as a minor risk while Internet Explorer was found to have 27 vulnerabilities, some of which were deemed critical security risks. The point is not that Internet Explorer is bad, but that

open source helps promote a more secure system. Fewer bug fixes and crashes mean better security for sensitive constituent data.

Government agencies that move to open source, switching from legacy systems to SUSE

Case Study

Boosting Reliability

Moving to Linux for a low-cost, dependable solution: Essex County in Ontario, Canada

Tired of a costly and unreliable operating system, Essex County migrated to Linux. Running SUSE® Linux Enterprise Server helps the county do more with its IT environment while staying within budget. Moving its back-end accounting system to SUSE Linux Enterprise Server has reduced software costs by 35 percent.

Essex is Canada's southernmost county — at the same latitude as northern California — and it is one of the most agriculturally productive counties in the nation. Essex County has a population of more than 166,000 and an agricultural output of C\$237,796,000 — greater than that of any one of the Atlantic provinces.

For a county government, small IT budgets are a common concern. The IT staff at Essex County stays focused on reducing costs and making the most of its investments. However, its Microsoft Windows environment was proving costly to administer with constant security patches and occasional downtime. Complicated and expensive licensing programs were also a big factor.

To reduce costs and improve stability, the county chose to migrate to Linux. While successful, the IT staff struggled to find the right Linux tools to manage its environment and began evaluating other Linux options.

The county IT staff attended a training course on using firewalls where the instructor had recently migrated to SUSE Linux Enterprise Server. The county then experimented with SUSE Linux Enterprise Server and was impressed with its ease of use.

"When we started using SUSE Linux, we found that its interface and tools were logically organized and more intuitive than those of Red Hat," said Jim Gignac, IT administrator for Essex County. "YaST is really what attracted us and makes everything simple to administer. Even someone with limited technical experience could quickly pick up SUSE Linux and be productive in a short period of time."

Essex County runs its mission-critical accounting system on SUSE Linux Enterprise Server on IBM® xSeries servers.

"Running our back-end accounting system on Linux was a huge leap for us," said Gignac.

"We moved from Windows 2000 to Red Hat Linux, then to SUSE Linux Enterprise Server with an IBM DB2 database and saw a big increase in speed and reliability. The server has not even had a hiccup."

With improved reliability, the county IT staff no longer spends its time patching systems and checks its servers a few times a month, rather than every day.

"In the past, we battled downtime, lockups and general instability," said Gignac. "To date, we haven't had a single virus issue with our SUSE Linux servers."

The team recently ported its two DNS servers to SUSE Linux Enterprise Server, in response to a mandate from the Canadian government to provide Internet services to participating municipalities. The county now provides DNS services to thousands of users without incurring high costs.

"We were slightly fearful about porting two DNS servers because we could not have them offline," said Gignac. "We moved them to SUSE Linux Enterprise Server, and it was a snap. Our SUSE servers are so stable, we could keep them in a closet."

Linux and open source tools expanded the development possibilities for a small IT staff on a lean budget.

"We like the freedom of choice we get with Linux and the support of the open source community," said Gignac. "If there is a bug or problem, you have the whole planet working to fix it. We find that issues get resolved nearly instantaneously. Open source is the only way to go."

Within the next year, the county plans to move many of its desktops to Novell® SUSE Linux Enterprise Desktop — as well as its file and print services to Novell Open Enterprise Server to maintain the advantages of NetWare® while moving to Linux.

"We are thrilled that we can move to Open Enterprise Server running on Linux without giving up the capabilities of NetWare," said Gignac. "Having the support of Novell in an open environment is perfect. I've worked with Novell for nearly 20 years and have never had an issue we couldn't resolve. The support is outstanding."

Moving to SUSE Linux Enterprise Server has given Essex County unprecedented stability and security against virus attacks. The IT staff has greatly reduced maintenance time, freeing up time to work on new projects. By moving its accounting system from Windows to SUSE Linux Enterprise Server, Essex County has reduced its software costs by 35 percent.

"With SUSE Linux and access to open source tools, we can implement far more services than we thought possible," said Gignac. "Without it, running our environment would be significantly more expensive, and we would be forced to spend most of our time putting out fires rather than implementing new and better technologies."

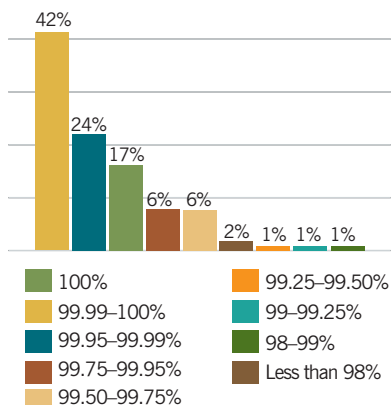




50 percent of government agencies surveyed by open source consulting and integration firm Optaros were using open source software.

Linux Enterprise Server, for example, can be confident about storing crucial data on open source systems. Whether it's driver's license records, Social Security, tax information or court records, open source offers a safer alternative. SUSE Linux Enterprise Server provides dramatically enhanced security to protect sensitive data such as license numbers and home addresses – and it does so with virtually zero downtime and at significantly reduced costs.

Linux Availability/Uptime**



**shown as a percentage of 200 Linux-run enterprises

Source: Get the Truth on Linux Management, Enterprise Management Associates, February 2006

Four: Government services demand reliability.

Open source systems are more stable and reliable than proprietary systems because open source systems are less vulnerable to viruses and are steadily improved by the growing open source community. Many studies or surveys will show that LAMP (Linux, Apache, MySQL, PHP) software packages, open source servers and databases are more resistant to crippling crashes.

According to a comprehensive 2004 report by Nicholas Petreley published by UK-based publication *The Register*, the top proprietary server could claim an average uptime of only 59 days, whereas open source servers reported hundreds – even thousands – of continuous days up.

Jefferson County, Colo., reports that some of its Linux servers have been running without a reboot for more than three years. Clearly such reliability leads to improved service delivery and significantly lower costs – which leads to the last benefit on the list.

Five: Open source is less costly.

Perhaps the best reason for government to switch to open source is the incredible potential to reduce costs. One agency, the Los Angeles Department of Building and Safety, reports hardware cost savings of 80 percent since moving to open source.

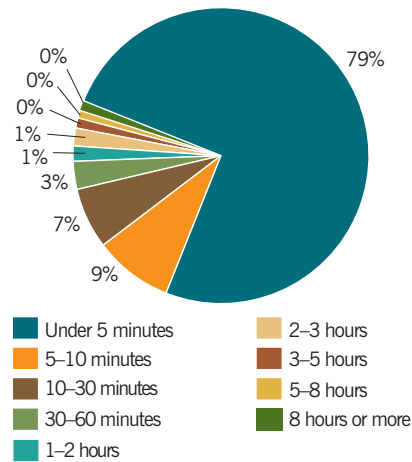
For most government – and private industry – organizations, after labor, proprietary hardware support is the largest expense. With open source, it's realistic to imagine opting for several \$4,000 industry-standard servers to run an enterprise instead of one proprietary server that costs \$100,000 or more. Not only will open source run on cost-effective commodity hardware, it's also easier and less expensive to support. Lastly licensing open source software is far less expensive than buying and licensing a UNIX or Windows server.

On average, government agencies that have adopted open source report 40 percent to 50 percent savings on hardware expenses while software costs are being driven down by as much as 40 percent.

It's Time for Open Source

Open source addresses many of the challenges facing government agencies, policymakers and IT staffs. It is a more secure, more

Virus and Spyware Management Time Spent per Linux Server per Week**



**shown as a percentage of 200 Linux-run enterprises

Source: Get the Truth on Linux Management, Enterprise Management Associates, February 2006

cost-effective and more reliable way to run an enterprise. That's why open source adoption is growing rapidly – from entire states like Massachusetts to statewide departments like the Oregon DMV to local governments like Jefferson County, Colo. Now is the time to examine the costs of proprietary licenses and proprietary hardware and then explore the difference open source can make.



Case Study

Nonstop Service

The security and stability of open source: the Oregon Department of Transportation

The Oregon Department of Transportation (ODOT) provides a safe, efficient transportation system that supports economic opportunity and livable communities for 3.6 million Oregonians. ODOT has approximately 4,500 employees.

The ODOT legacy OS/2 system for managing driver's license record communication statewide was difficult to manage and impossible to upgrade. When the system went down, ODOT was forced to send home anyone waiting for a driver's license at a DMV office while staff members worked to restore the system.

ODOT needed a reliable system to protect the confidential driver information of its citizens without straining its IT budget. Completely replacing the system was cost-prohibitive, so ODOT turned to open source tools to rewrite the communication component to run on Linux.

As a Microsoft Windows and mainframe shop, ODOT evaluated using Windows and OpenConnect before selecting open source and Linux. Using open source tools and C code, the department rewrote the communication component of the driver's license management system in about 80 hours.

"We could not have achieved such remarkable development speed without open source tools," said Steve Adams, senior systems administrator at the Oregon Department of Transportation. "We now have an agile, modular system that would have taken us three times as long to create with any other platform."

ODOT selected SUSE® Linux Enterprise Server to replace Red Hat and run the application on its IBM z800* mainframe server. The new system has been running for more than six months without a minute of downtime.

"Support is important to us, and we've had difficulty getting timely support in the past," said Adams. "Novell's purchase of SUSE and dedication to the Linux market makes all the difference. Novell's support is legendary."

A reliable system has dramatically reduced administration time, freeing up members of its IT staff to do more than look after an aging system. The staff no longer gets off-hour calls to get the system running again and can easily make changes to the system when needed.

"With Linux, our department users have zero downtime, and we can give faster and better customer service," said Adams. "SUSE Linux is just a good, solid operating system, and everything we do with it is successful."

SUSE Linux Enterprise Server provides unparalleled security to protect confidential personal information, such as a citizen's license number, address and date of birth. Tight security helps ODOT comply with strict Privacy Act requirements.

"Security is always a compelling factor in everything we do," said Adams. "With Linux, a published kernel bug will get fixed in a matter of hours. In the Windows world, it takes months to get a patch. The biggest advantages of SUSE Linux are reliability, performance and cost.

"We are saving a ton of money with the ability to run it on Intel-based hardware, as well as mainframes," Adams continued. "There's a big belief out there that mainframes are expensive, but mainframes running Linux are not."

By rewriting a component of its driver's license management system using open source and Linux, ODOT avoided paying \$120,000 for a new system. An agile system running on Linux gives the department 99.999 percent uptime, instead of its previous 82 percent. Moving to SUSE Linux Enterprise Server has also reduced its software costs by more than 30 percent.

"We deployed Linux as another tool to help overcome some of our state government's biggest challenges — a shrinking budget and increasing demands for service," said Adams. "Now we can deploy applications at a lower cost and get far greater reliability. Linux simplifies things tremendously."

DoD Achieves Milestone

The U.S. Department of Defense (DoD) is using Linux computing clusters to upgrade high-performance computing in its research facilities. A new system, delivered to the DoD by Linux Network*, is part of an effort to put advanced technology in the hands of U.S. armed forces more quickly, less expensively and with greater certainty of success.

The 2,048-processor cluster system has achieved performance of 10.65 trillion operations per second. The system is the most powerful supercomputer at the Army Research Laboratory Major Shared Resource Center (ARL MSRC) and is the 24th fastest supercomputer in the world. The ARL helps the DoD develop weapon systems faster and more efficiently.

The system was deployed as part of an initiative to modernize the DoD's computing capabilities. The ARL has been working to optimize the system for remarkable performance and reliability. It's achieved performances of 10.65 teraflops and 72 percent efficiency, making it a more effective tool for DoD applications.

The ARL MSRC, one of the world's most powerful computing sites, uses the system to support various applications. The system provides an increase in computing capability, enabling the DoD to solve complex problems in a shorter timeframe — thus providing soldiers with the best technology and weapons systems available and allowing them more time for training, enhancing their readiness and potentially saving lives.

The open source system was tested extensively and fine-tuned to the ARL's exact specifications after delivery, helping the ARL solve complex, mission-critical problems faster than ever before.

Supercomputer services, high-speed network communications and computational science expertise enable U.S. Defense laboratories, such as ARL, to conduct a wide range of research and development.



On average, government agencies that have moved to open source save **40 percent to 50 percent** on hardware and as much as **40 percent** on software.



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