



Red Hat and the Federal Enterprise Architecture

Abstract

This paper discusses why open source—specifically the Red Hat Open Source Architecture (OSA)—is becoming the standard for government agencies working within the framework of the Federal Enterprise Architecture (FEA).

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Introduction

Built to exploit common functionality and reduce IT redundancies, the Federal Enterprise Architecture (FEA) requires an architecture that can deliver not only on today's business transformation needs but also has the ability to adapt and scale to future demands.

The Red Hat Open Source Architecture (OSA) is becoming the standard for government as more and more agencies are choosing Linux® and open source technologies as the foundation for their FEA-compliant computing infrastructure. The Red Hat OSA is a solution of standards-based technologies and services that allows open source and traditional software applications to be deployed in a predictable, stable environment.

The OSA provides government agencies the basis for complying with critical initiatives like e-government, security, identity management, systems consolidation, and modernization and emerging directives like HSPD-12 and Internet Protocol version 6 (IPv6) standardization.

The Red Hat Open Source Architecture

In the past, lack of a comprehensive, standards-based open source technology architecture has added to the complexity of new open source deployments and potentially increased the cost. To reduce this complexity, Red Hat launched the Open Source Architecture (OSA) in October 2003. The OSA encompasses Red Hat's long-term vision for open source software development and deployment. It delivers a suite of standards-based technologies and services, allowing open source and traditional software applications to be deployed in a predictable, stable environment. The OSA also provides comprehensive systems management that enables improved efficiency in provisioning, asset management, and application monitoring, as well as scalability enhancements that reduce IT staffing requirements and associated expenses.

Red Hat® Enterprise Linux®, the flagship of the OSA, is the world's leading enterprise-focused Linux environment with over a half a million subscribers annually. Based on the 2.6 kernel,



version 4 released in February 2005 provides improvements in security capabilities, increased server performance and scalability, improved storage and file system capabilities, and improved desktop capabilities—all while ensuring a high level of compatibility with prior releases and supporting a wide range hardware and software applications (<http://www.redhat.com/software/rhel/features/>).

Red Hat's plug-in extensible OSA provides a roadmap for the technologies that Red Hat and its partners will continue to expand upon—technologies that span the operating system, middleware, applications, and management tools. Such expansion will enable technology users to extend the benefits of open source throughout their organizations.

Features of Red Hat Open Source Architecture

- Creates products and services that bring the benefits of standards-based and open source solutions to the complete software solution stack.
- Stimulates broad participation and collaboration across hardware and software vendors and the open source community through the Fedora foundation.
- Extends the security and reliability of transparent computing.
- Extends Linux, open source solutions, and ISV partner applications to cost-effectively provide massive horizontal and vertical scalability.

Utilizing such an architecture, Red Hat is helping governments worldwide leverage their technology investments to make services more accessible to citizens. Governments in the US, Australia, China, Singapore, South Korea, Brazil, Spain, France, and the UK look to Red Hat to help address their OSS needs.

Red Hat has kept pace with the increasing demand for open source solutions. The world's leading supplier of commercial-strength Linux solutions, the Red Hat Enterprise Linux family of products provides the most comprehensive suite of mission-critical solutions available, utilizing a plug-in extensible architecture through Red Hat Enterprise Linux, Red Hat Network, and applications.

Red Hat also provides a full range of services to help organizations better utilize Linux and open source technology.



Red Hat's professional services team offers customers an extensive array of services, enabling seamless operation of systems from desktop to datacenter. Regardless of the size and scope of the project, Red Hat's professional services follow a disciplined approach utilizing focused project management to ensure quality, consistency, and timeliness of delivery.

Red Hat's performance-based training program can also benefit government employees. Red Hat training programs offer the most current and accurate hands-on training courses and the world's most respected Linux certifications, including Red Hat Certified Technician, Red Hat Certified Engineer, and Red Hat Certified Architect.

The rise of open source and Linux in government

A growing number of corporations and institutions, including the Federal Government, are adopting Linux and open source to realize the benefits of improved performance, reduced costs, and greater control. They've experienced that Linux is also stable, portable, and easy to deploy.

Organizations including the National Weather Service (NWS), US Census Bureau, US Postal Service, National Institute of Standards and Technology (NIST), the White House, and Department of Defense (DoD) have all been adopters of open source and Linux.

The following timeline outlines the recent history of open source adoption in the government.



Open source and Red Hat in government

2000

Department of Energy, NASA, US Post Office, and NIST begin to use open source and Linux.

2001

Census Bureau, White House, and DoD adopt Linux.

2002

MITRE issues report on the use of free and open software in the DoD.

Federal Aviation Administration, National Institutes of Health, and NASA roll-out Linux deployments.

2003

DISA issues first Common Operating Environment (COE) Certificate for Linux to Red Hat Enterprise Linux.

DoD issues open source policy, leveling the playing field for open source technologies in the DoD.

Office of Management and Budget incorporates open source and Linux into the Federal Enterprise Architecture.

National Weather Service rolls out AWIPS and NCEPS systems based on Red Hat Enterprise Linux.

2004

PTO announces move towards Linux and Java in new IT and telecom contracts.

Army announces 2132-processor Linux cluster investment.

GSA launches eOffers built on open source technologies.

Red Hat Enterprise Linux awarded Common Criteria evaluation EAL 3+/CAPP on all supported architectures.

US Marshal Service reports migrating to open source and Red Hat.



2005

Red Hat Enterprise Linux 4 submitted for Common Criteria EAL 4+/CAPP evaluation; award expected in Fall 2005.

DOE CIOs standardize on Red Hat for National Labs and Technology Centers.

DHS/AMO choose Red Hat for new nation-wide radar monitoring system.

U.S. Navy looks to increase its use of open-source software through a research and development program.

DISA renews Defense-wide agreement for Red Hat Certificate Management System.

Commerce awards BPA to DLT Solutions for Red Hat products and services.

Why government agencies are choosing the Red Hat Open Source Architecture

Red Hat Open Source Architecture allows customers to:

- Maintain full control of IT investments.
- Optimize open standards-based integration, enabling vertical and horizontal information sharing.
- Consolidate services by extracting higher performance without increasing budget requirements.
- Improve network security protecting critical information and users.

The following departments in the federal government are running Red Hat Enterprise Linux.

NOAA	DHS/FEMA	US Air Force
DOE	DOI	US Army
NASA	GSA	US Navy
U.S. Courts	PTO	US Marines
FAA	DISA	US Marshal Service
DOC	USDA	Intelligence Community



Availability

Red Hat provides availability to government customers to choose the purchasing vehicle that is right for them. Through a number of contracts, Blanket Purchase Agreements (BPAs), and Enterprise Agreements, Red Hat guarantees the ease of purchase.

Government Contracts	
GSA Schedule GS-35F-4543G SEWP III - NAS5-02143 ECS III - 263-03-D-0565 DISA BPA – HC1013-04-A-5000G DOC BPA – DG133W05BU1068 Department of Energy	SEWP III NAS5-01142 ECS III 263-03-D-0504 PCHS V101(93)P-1843 USC RQ03-605674-16A US Courts IDIQ

Choice

Open source fully supports vendor-neutral, open standards as outlined in the FEA Technical Reference Model. This maximizes interoperability between agencies, departments, and government entities while enabling full control of IT investments.

For Red Hat customers, this means having choices in building their architectures. Red Hat Enterprise Linux runs on most platforms including x86; Intel® Itanium®; Intel® EMT64; AMD® AMD64; and IBM® xSeries®, iSeries, zSeries®, POWER, and S/390. Red Hat Enterprise Linux customers can also choose among a wide range of hardware solutions from OEM partners like IBM, Dell, Hewlett Packard, Fujitsu, SGI, Unisys, and Sun. Customers also have the freedom to utilize more than 1800 certified applications from a wide range of industry-leading solutions including BEA, EMC, IBM, Oracle, PeopleSoft, SAP, and VERITAS.

Undeniable budget/performance advantages

Open source and Red Hat are ideally suited to assist the federal government in its efforts to improve performance and increase security and effectiveness of services. Numerous independent studies have verified that Linux on commodity hardware offers tremendous performance advantages while delivering significant cost savings.



Studies have shown that Linux systems require fewer hardware resources than alternatives such as Microsoft® Windows® and UNIX®. Users can also select the optimum server to suit the workload. Coupled with powerful, yet economical processors, Linux can support government agencies in performing critical functions.

Industry benchmarks like TPC-C, TPC-H, and ECperf provide a method for solution-based price/performance comparisons. The most recent Red Hat Enterprise Linux 4 test results set a world record, illustrating its compelling price/performance capabilities (<http://www.redhat.com/software/rhel/benchmarks/>).

Outstanding performance leads to consolidation of distributed workloads such as web serving, application servers, data management, and storage.

International Data Corporation (IDC) conducted studies in 2001 and 2003 on the cost-effectiveness of deploying Red Hat for mission-critical applications. The 2001 study identified a distinct total cost of ownership (TCO) for Linux on Intel-based servers over UNIX on RISC servers. The 2003 study, "Linux and Intel-Based Servers, a Powerful Combination to Reduce the Cost of Enterprise Computing," confirmed the earlier results.

On average, the companies interviewed for the IDC study realized a return on investment (ROI) of 504% when assessed over a three-year time frame at a discount rate of 10%. In most cases, the payback of the initial investment in hardware and software was achieved in less than three months.

In a new study "TCO for Application Servers—Comparing Linux with Windows and Solaris," Robert Frances Group found that Linux continues to lead in total cost of ownership over Windows x86 (40%) and SPARC Solaris (54%). Participants from a range of industries also cited the strategic benefits of Linux beyond TCO, including flexibility, broad ISV support, scalability, security, hardware and vendor choice. (<http://www-1.ibm.com/linux/whitepapers/robertFrancesGroupLinuxTCOAnalysis05.pdf>)

Harnesses the power of open standards and open source

The open source development model has been responsible for delivering some of the most prevalent technologies over the past decade including Linux, Apache, BIND, and Sendmail to name only a few. In fact, Apache has grown to be the most widely deployed web server with 70% share of the install base. New open source technologies delivered in Red Hat Enterprise Linux 4 such as Security-Enhanced Linux and ExecShield elevate secure computing transparently.

The Red Hat Open Source Architecture is being utilized to support all components of the FEA Technical Reference Model and is especially well suited for the following services:

- Databases
- Application servers/middleware
- Custom C/C++/Java applications
- High performance computing
- Workstations (technical, developer, single purpose)
- Network and Internet infrastructure
- Animation graphics and rendering
- Electronic design automation (EDA)

The Red Hat OSA supports widely adopted open standards, including Extensible Markup Language (XML), Internet Protocol version 6 (IPv6), IP Security Sockets Layer (IPSEC), Secure Sockets Layer (SSL), and Lightweight Directory Access Protocol (LDAP).

Critical to the success of any IT endeavor is the ability to interface both with existing legacy systems, and between user communities. The Red Hat Open Source Architecture facilitates government's need for increased communication and data sharing with Red Hat Application Server and Red Hat Global File System (GFS). Red Hat GFS allows Red Hat Enterprise Linux servers to simultaneously read and write to a single shared file system on the SAN, achieving high performance and reducing the complexity and overhead of managing redundant data copies. Red Hat GFS has no single point of failure, is incrementally scalable from one to hundreds of Red Hat Enterprise Linux servers, and works with all standard Linux applications.

The Java-based Red Hat Application Server provides extensive middleware support for linking systems and resources while simplifying web application development. Engineered and tested with Red Hat partner technologies including those from BEA, IBM, and Oracle, Red Hat Application Server easily integrates with these vendors' full-featured J2EE application servers. This solution gives customers the ability to choose an open source solution based on budget and business need while protecting their existing J2EE investments. And because it runs on commodity hardware platforms such as IA-32, Intel® Itanium®, and IBM® POWER series, Red Hat Application Server allows customers to use less expensive hardware for their Java applications as well.

Secures e-government

Security and reliability have always been important features of open source technology. Created in the age of the Internet, Linux was designed to protect users, systems, and data in highly-networked environments. Moreover, its open source development model allows secure technologies to scale economically across organizations and the Internet, providing a safer computing environment for everyone.

Red Hat continues to enhance computing security by providing organizations with:

- Well-documented patches that are easy to understand and pre-coordinated with hardware and software vendors for compatibility.
- Unified system management tools such as Red Hat Network that make maintaining and securing large networks of machines faster and easier.
- New security technologies that reduce the number of inherent vulnerabilities while providing more control over users, applications, and data.
- Newly launched Identity Management products (Directory Server and Certificate System) which centralize, simplify, and integrate management tasks, reducing requests and minimizing labor hours and costs.

Security-Enhanced Linux (SELinux), introduced in Red Hat Enterprise Linux 4, has a strong, mandatory access control architecture incorporated into the major subsystems of the Linux kernel and is a major security component of the OSA. Developed by the National Security Agency as a research prototype, SELinux provides a mechanism to enforce the separation of information

based on confidentiality and integrity requirements. By allowing threats of tampering and bypassing of application security mechanisms to be addressed, SELinux enables the confinement of damage that can be caused by malicious or flawed applications. This allows the Linux operating platform to support stronger levels of security than any other mainstream operating system available today.

Linux assurance

Certifications and software evaluations promote software assurance. Red Hat has been recognized for its compliance to standards and the security of its products.

Awarded COE certification by the US Defense Information Systems Agency (DISA) in 2003, Red Hat Enterprise Linux is approved for Department of Defense deployment. Common Operating Environment (COE) certification assures that Red Hat Enterprise Linux meets DISA's stringent requirements for interoperability, performance, and standards compliance.

In August 2004, Red Hat Enterprise Linux 3 achieved Controlled Access Protection Profile compliance under the Common Criteria for Information Security Evaluation (CC), commonly referred to as CAPP/EAL3+. This evaluation is in compliance with the US government's security policy directive, NSTISSP (National Security Telecommunications and Information Systems Security Policy) Number 11 which requires independent security evaluations for products used in national security systems.

Red Hat continues to execute its plan to pursue higher levels of evaluation in 2005. Red Hat Enterprise Linux 4 is currently recognized "in evaluation" by the National Information Assurance Partnership (NIAP) for Controlled Access Protection Profile compliance under the Common Criteria for Information Security Evaluation (CC), commonly referred to as CAPP/EAL4+ ([http://www.redhat.com/solutions/industries/government/common criteria/](http://www.redhat.com/solutions/industries/government/common_criteria/)).

Conclusion

Today, hundreds of government organizations around the globe, at every level of government, rely on open source and Linux to serve their constituents. More and more federal agencies are turning to Red Hat and the Red Hat Open Source Architecture as an FEA-compliant solution that serves the basis for advancing to the next level of e-government and securing their networks.

Through this component-based architecture, Red Hat OSA optimizes open standards-based systems integration, allows for services consolidation, and extracts higher performance without increasing budget requirements.

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