

# DEPLOYING JAVA EE APPS IN CLOUD AND CONTAINER ENVIRONMENTS

## TECHNOLOGY OVERVIEW

### FEATURES

- Fully certified Java Enterprise Edition (EE) 7 and Java SE 8 support
- Full web services stack
- Modular architecture optimized for containers and cloud deployments
- Enterprise capabilities such as failover, distributed caching, intelligent load balancing, clustering, and distributed deployment
- Integrated development environment (IDE) that maximizes productivity and performance

### BENEFITS

- Deploy new business value, faster
- Increased developer productivity
- Manage flexibly
- Develop and deploy with Java EE in any environment
- Quickly reinvent and update your systems of engagement

### ORGANIZATIONS STRUGGLE TO DELIVER APPLICATIONS FASTER

As the leader of a Java™ organization, you struggle to deliver business value and innovation to market faster than your competition. Your application development teams must meet strict, diverse requirements while improving efficiency and decreasing costs. To keep up with today's pace, your organization has to deliver new applications and updates in days or weeks—not months. But speedy delivery of new features is not the only requirement. Applications must also be reliable, perform smoothly at large scale with millions of connections, and meet strict security and compliance expectations.

Beyond rapidly delivering high-quality applications, your teams must grapple with application deployment in different environments. Legacy applications are mostly deployed in on-premise or virtual environments, and new applications are increasingly being deployed into private, public, and hybrid cloud environments.

Successful leaders are turning to DevOps methodologies, microservices architectures, and containers to accelerate application development and delivery, maintain high levels of quality and reliability, and achieve technical flexibility. To support these new approaches, you must choose a platform flexible enough to meet diverse application needs. The right platform can help you:

- Rapidly deploy web-scale Java EE applications to cloud environments.
- Standardize and simplify infrastructure.
- Support on-premise deployments.
- Attain high levels of developer productivity.

### DEVELOP AND DEPLOY RAPIDLY

Red Hat® JBoss® Enterprise Application Platform (JBoss EAP) is the market-leading open source platform<sup>1</sup> for modern Java applications deployed in any environment—on-premise, virtual, public, private, or hybrid cloud. JBoss EAP is well-suited for organizations with demanding reliability, security, and compliance requirements that need developer-friendly technology, high productivity, and flexible deployment. Organizations that use JBoss EAP can support a wide range of Java applications, including HTML5 mobile applications, microservices apps, and highly transactional applications that use the Java EE programming approach.

JBoss EAP helps deliver business value more quickly and with greater flexibility, resulting in lower costs, fast and easy scale out, and reduced IT complexity. Organizations moving to JBoss EAP have achieved 509% return on investment over three years, while developing 70% more applications per year with 35.5% less developer hours per application.<sup>2</sup>



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<sup>1</sup> 2013 Gartner Magic Quadrant for On-Premises Application Platforms

<sup>2</sup> <https://engage.redhat.com/jboss-eap-idc-s-201508032204>



Figure 1. Red Hat JBoss EAP structure

*“A crucial factor in our decision to choose Red Hat JBoss EAP was the desire to standardize application development. Previously, it was carried out on servers and clients with a variety of different tools. This multi-layered, distributed system allows us to operate in a noticeably more efficient manner and simplifies all of our management processes.”*

RAINER SCHÜGERL  
HEAD OF TECHNOLOGY,  
AUSTRIAN SOCIAL SECURITY  
CHIPCARD PROVIDER AND  
OPERATOR (SVC)

## ONE PLATFORM FOR ALL YOUR NEEDS

A fully certified Java EE 7 application platform, JBoss EAP is based on flexible, modular architecture with services-driven components and is ready for deployment in cloud environments. The platform offers powerful management and automation for greater developer productivity and is based on the open source Wildfly project (formerly known as JBoss Application Server). JBoss EAP features include:

- High-availability clustering.
- Distributed caching.
- Messaging.
- Transactions.
- A full web services stack.

JBoss EAP has everything you need to build, run, deploy, and manage enterprise Java applications in any environment, including across hybrid cloud environments. It supports a wide range of application requirements, as well as integration with a variety of standards, and is completely open source. This provides technical flexibility and helps you avoid switching costs related to vendor lock-in.

## ADDITIONAL RESOURCES

Try Red Hat JBoss Enterprise Application Platform on OpenShift Online. Discover the benefits of developing Java EE applications in a Platform-as-a-Service (PaaS) environment. Leave provisioning, management, and scaling behind and focus on the important work—writing code for your next big Java application.

Learn more:

<https://developers.openshift.com/jboss-xpaas/>

JBoss EAP allows you to use the same code base to deploy Java applications in different environments, including:

- Bare metal.
- Virtualization platforms like Red Hat Enterprise Virtualization and VMWare ESX.
- Private cloud environments like Red Hat OpenStack Platform.
- Public cloud environments like Microsoft Azure or Amazon Web Services.

JBoss EAP is well-suited for microservices, as well as traditional applications. This provides the flexibility to build applications as they are needed.

By offering compatibility with popular continuous development and continuous integration (CI/CD) tools and technologies, JBoss EAP helps boost developer productivity and allows DevOps methodologies.

JBoss EAP helps you combine, improve, and extend your Java EE applications with the full benefits of cloud and container environments. JBoss EAP is:

- **Highly efficient and optimized for container and cloud deployments.** JBoss EAP 7 offers an extremely low memory footprint, fast start-up times, efficient resource utilization, reduced port usage, and management and monitoring over HTTP (REST).
- **Able to support your application as it evolves** through resource-efficient scale out, high-density deployment options, and dynamic scaling.
- **Lightweight, with a small footprint that minimizes hardware resources and costs**, especially when deploying applications into resource-constrained environments, such as in cloud environments or containers.
- **Fast to start-up**, saving developer cycle time during development and testing while providing fast, elastic scale out in production.

## EAP 7 FEATURES

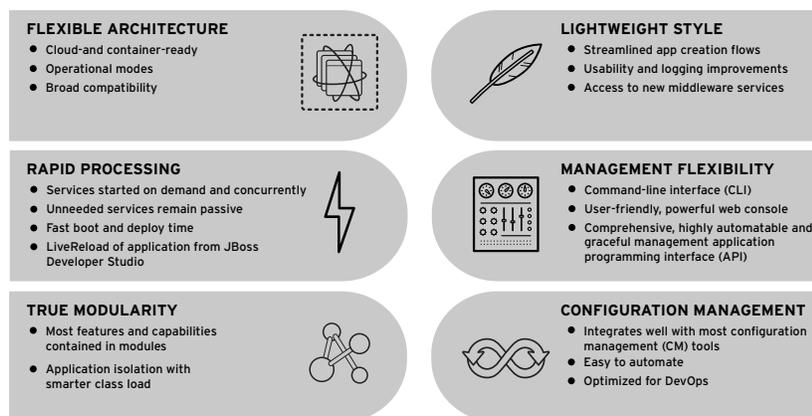


Figure 2. Red Hat JBoss EAP Features.

Download Red Hat JBoss Enterprise Application Platform. All of our products are open source, which means you can install them, run a demo, and develop a proof-of-concept. Eliminate risk by trying the software before you buy.

Learn more:  
<https://www.redhat.com/en/technologies/jboss-middleware/application-platform>

Explore a rich library of resources. Get up to speed fast by viewing a webinar, trying out a tutorial, or watching a demo.

Learn more:  
<https://www.redhat.com/en/technologies/jboss-middleware/application-platform>

Get involved. Open source software belongs to you. Blog, join a user group, contribute code, or test upcoming releases.

Learn more:  
<http://developers.redhat.com/products/eap/community/>

## RUN JBOSS EAP IN THE CLOUD VIA RED HAT OPENSIFT

When you deploy Red Hat JBoss Enterprise Application Platform into Red Hat OpenShift environments, you gain full Java EE capabilities in both private and public cloud environments. Since you don't have to create or maintain the development environment, you can prototype ideas quickly and take successful ones to market faster.

Red Hat's application hosting platform also makes it easy to run container-based web applications. Self-service application provisioning, simplified stack management, and application auto-scaling help boost productivity and improve application design and delivery. And Red Hat OpenShift Container Platform lets you take advantage of Linux® containers based on Docker technology and Kubernetes container orchestration for app development and deployment.

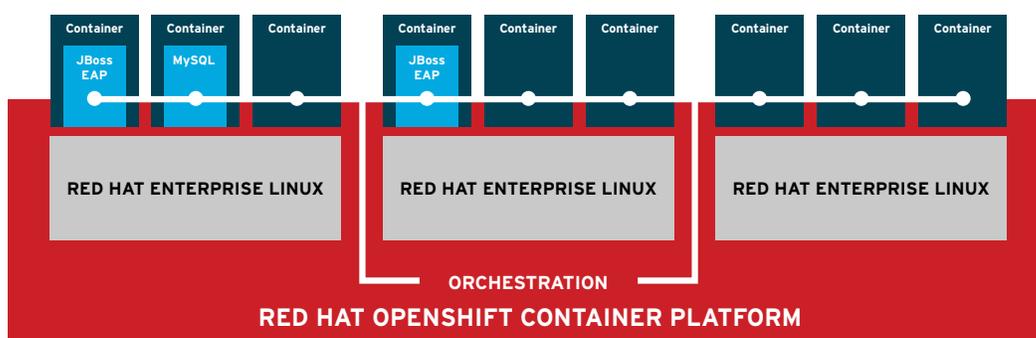


Figure 3. Orchestration using Red Hat OpenShift Container Platform

## ARCHITECTURE FOR CLOUD, MICROSERVICES, AND CONTAINERS

Red Hat JBoss Enterprise Application Platform 7 builds on the foundation created by JBoss EAP 6, offering a modular, lightweight stack that can be deployed in any environment. It meets requirements that span from traditional applications to new web-scale, microservices apps, giving organizations that standardize on JBoss EAP the flexibility needed to build applications that fit their business needs.<sup>3</sup>

## FLEXIBLE MANAGEABILITY AND UNIFIED ADMINISTRATION

JBoss EAP can maximize administrative productivity, making it simple to efficiently maintain and update any scale of Java EE deployment. JBoss EAP 7 features an updated management console user interface that includes intuitive navigation and support for large-scale domain configurations.

In addition, management using the updated command-line interface (CLI) provides administrators with a quick, unified view into configurations and subsystems and offers the ability to manage servers offline. The CLI can be used with popular configuration management tools such as Ansible Tower by Red Hat or Puppet. Together, the management console and CLI make editing XML configuration files unnecessary. With JBoss EAP, administrators can now perform minimally disruptive maintenance using the new server suspend mode to gracefully shut down servers.

<sup>3</sup> 2013 Gartner Magic Quadrant for On-Premises Application Platforms

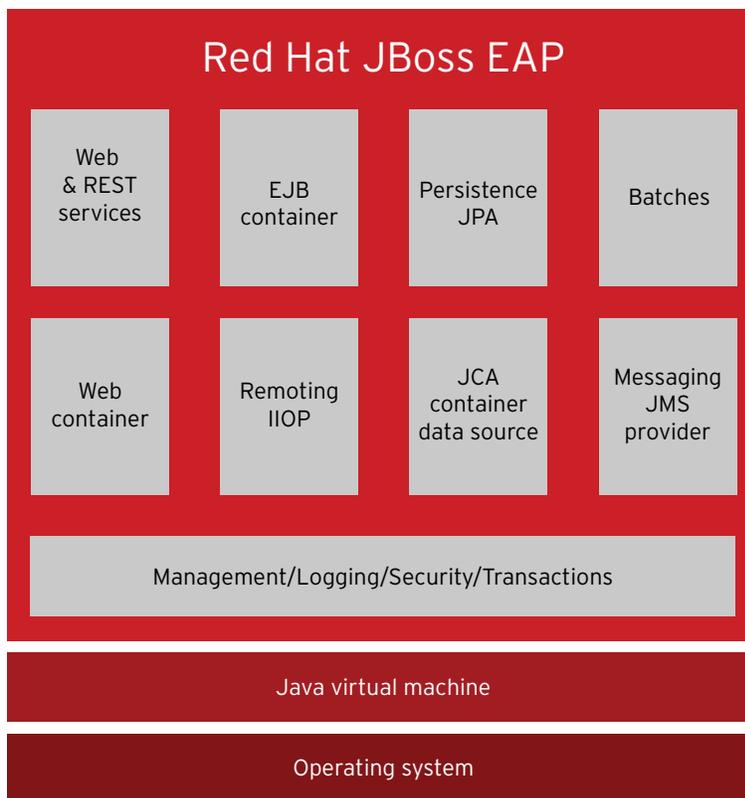


Figure 4. Red Hat JBoss EAP architecture

## ENTERPRISE PERFORMANCE AND SCALABILITY

JBoss EAP is performance-tuned for highly transactional applications, providing you the flexibility to quickly build and deploy applications while simultaneously meeting strict compliance, security, and regulatory requirements.

**Meet a diverse range of Java application requirements** with a combination of Java EE 7 compliance, integration with the latest open standards, and the addition of enterprise capabilities such as failover, high-availability clustering, distributed caching, intelligent load balancing, and distributed deployment.

**Maximize throughput and scalability** for environments with millions of connections with Undertow, a highly scalable, non-blocking I/O (NIO) modern web server. Undertow can also be configured to function as a multiplatform load balancer.

**Reduce latency and improve load times** with support for HTTP/2 standards (technical preview for JBoss EAP 7), which compresses headers and multiplexes data streams over a single Transmission Control Protocol (TCP) connection. HTTP/2 also allows servers to push resources to the client before it has requested them, leading to faster page loads.

## DEVOPS AND CI/CD

Trends like big data, Internet of Things (IoT), and mobile require developers to respond and adjust faster than ever before. JBoss EAP supports developer productivity by integrating with common DevOps tools, letting you maximize development and operations teams' productivity, decrease quality issues, and get new apps to market fast. JBoss EAP helps you:

- **Prototype ideas quickly.** With JBoss EAP and Red Hat OpenShift Container Platform you can boost your productivity with features like self-service application provisioning, simplified stack management, and application auto-scaling.
- **Automate CI/CD infrastructure.** Tools like Red Hat CloudForms and Ansible Tower by Red Hat help automate provisioning and configuration, whether you are running on-premise or in public, private, or hybrid cloud environments. And with Arquillian for integration testing, Maven for automated and managed build processes, and Jenkins for continuous integration, you can respond to new requirements faster than before.

### Example of provisioning part of a CD pipeline



### Example of a CD pipeline



Figure 5. Examples of provisioning and continuous development

- Integrate your third-party web interfaces with support for popular frameworks, including Spring, Spring Web Flow, Spring WS, Spring Security, Arquillian, AngularJS, jQuery, jQuery Mobile, and Google Web Toolkit (GWT).

## SUPPORTED STANDARDS

JBoss EAP 7 is a certified Java EE 7 application server that supports Java SE 8. Java EE 7 includes four new specifications that help developers be more productive and build web-scale applications.

Other supported standards include:

- Web services standards like Simple Object Access Protocol (SOAP) and associated WS-\* standards.
- Security standards such as Security Assertion Markup Language (SAML), WS-Trust, and SPNEGO/Kerberos.
- Connectivity standards such as Java Database Connectivity (JDBC).
- The latest web standards, including HTTP/2, HTTP Upgrade, and WebSockets.

## INCLUDED WITH RED HAT JBOSS EAP

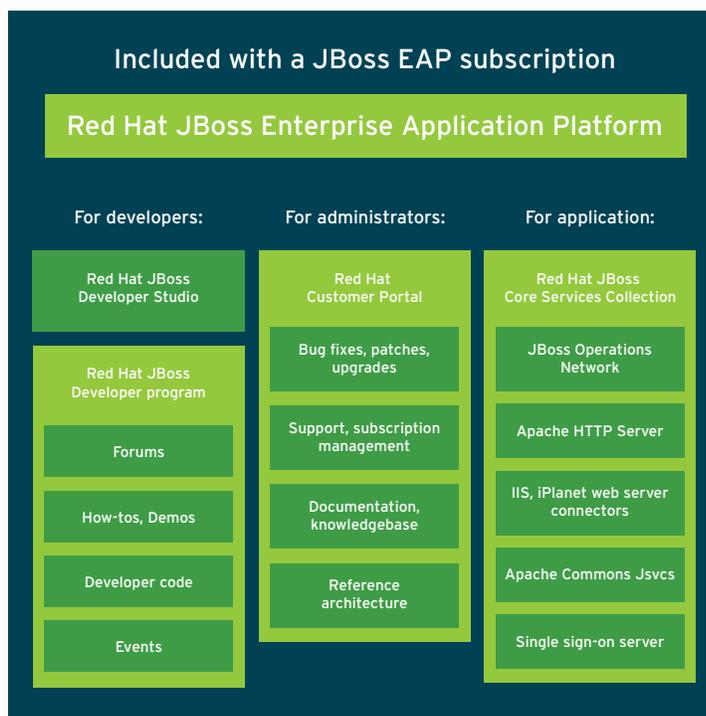


Figure 6. What's included with a Red Hat JBoss EAP subscription

A JBoss EAP subscription is more than just support for an application server—it gives you everything you need to develop, build, test, deploy, and maintain your enterprise Java applications. A subscription to JBoss EAP:

- Is backed by Red Hat's support and services organization, with access to Red Hat's award-winning Customer Portal.<sup>4</sup>
- Includes entitlements to several popular application development tools.
- Eliminates complicated purchasing choices that lock you into limited approaches, strategies, and business opportunities.
- Can make existing applications more efficient.
- Supports deployment across multiple environments.
- Lets you move applications to hybrid or cloud environments on your own timeline.

<sup>4</sup> <https://access.redhat.com/recognition>

## RED HAT JBOSS CORE SERVICES COLLECTION

JBoss Core Services Collection provides entitlements to popular capabilities that are frequently deployed with applications built with Red Hat JBoss Middleware technologies. JBoss Core Services entitlements are included at no additional charge with subscriptions for JBoss EAP and many other JBoss Middleware products. Subscribers receive full support for JBoss Core Services Collection, including online and phone support, updates, patches, and security fixes.

JBoss Core Services Collection includes:

- Red Hat JBoss Operations Network, which provides management, monitoring, and metrics from a centralized point for all your JBoss Middleware products. This helps improve operational efficiency, reduce costs, and provide a more positive experience for your users.
- Entitlements for Apache HTTP server, which allows JBoss EAP applications to handle incoming web requests.
- Single sign-on server.
- Apache Commons Jsvc.
- Microsoft Internet Information Services (IIS) Connector.
- Oracle iPlanet Connector.

## INTEGRATED DEVELOPER ENVIRONMENT WITH RED HAT JBOSS DEVELOPER STUDIO

Red Hat JBoss Developer Studio is a bundled Eclipse IDE that supports your entire development life cycle and includes tools for developing, testing, and deploying rich web applications and enterprise applications.

JBoss Developer Studio includes tooling capabilities and support for multiple programming models and frameworks, including:

- Java EE 7.
- Enterprise Java Beans (EJB).
- Hibernate.
- RESTful Web Services.
- Java applications.

There is no need to buy multiple subscriptions to build and test on Red Hat JBoss Middleware products or pay production service-level agreements (SLAs) to get support. It's all included.

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4 <https://access.redhat.com/recognition>

## MOVING TO RED HAT JBOSS EAP 7 FROM IBM WEBSHERE OR ORACLE WEBLOGIC SERVERS

Red Hat can help you make the move from IBM WebSphere or Oracle WebLogic application servers to JBoss EAP. Red Hat Consulting has a full complement of migration engagements, including methodology, tooling, and migration factory services.

### FROM OLDER VERSIONS OF JBOSS EAP

For JBoss EAP 7, migration operations help you quickly upgrade from older versions of JBoss EAP or Wildfly. JBoss EAP 7 provides interoperability with existing JBoss EAP 6 environments through improved protocol version support and tooling.

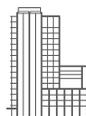
The new messaging subsystem is based on Red Hat's unified messaging technology, Apache ActiveMQ Artemis. ActiveMQ Artemis lets you pass messages between JBoss EAP 6 and JBoss EAP 7 and preserves the performance, scalability, and reliability of HornetQ from JBoss EAP 6.

## CONCLUSION

Delivering the level of innovation and productivity your customers demand continues to challenge even the most efficient developers. To meet these demands, you need an application development platform that can support your on-premise infrastructure and the additions you make to it in the future.

Red Hat is a vendor proven to provide enterprises with the engineering and support they need.<sup>5</sup> JBoss EAP pushes beyond the Java EE spec to offer additional enhancements focused on developer-friendliness and high productivity. The platform helps you modernize application delivery, standardize across on-premise and cloud architectures, and work seamlessly with the latest developer tooling and DevOps practices. An infrastructure based on JBoss EAP lets you keep pace with new cloud architectures and microservices-based processes. This gives your modern enterprise the flexibility, agility, and speed to deliver innovative applications to market faster.

<sup>5</sup> <https://www.redhat.com/en/resources/jboss-subscription-value-whitepaper>



## ABOUT RED HAT

Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to provide reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.



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