

A Custom Technology Adoption Profile Commissioned By Red Hat | June 2016

# The State Of Containerization

How, Where, And Why Are Containers Leveraged In The Software Development Life Cycle?

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# The State Of Containerization

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## How, Where, And Why Are Containers Leveraged In The Software Development Life Cycle?

The rapid, continuous development and delivery of high-quality software isn't just a competitive differentiator anymore: It's a requirement to remain viable as a company, regardless of industry. As consumers demand more innovative capabilities and firms require ever-more robust infrastructure and applications to serve increasingly discerning customers, IT professionals involved in the application development life cycle are hungry for tools and processes that reduce friction and shorten timelines. Enter Linux containers: a tried-and-true technology whose starring role in DevOps methodology means it's in high demand today. But where and how, exactly, are containers gaining the most traction? And if they actually merit all the hype, why haven't all organizations put them at the center of their development processes?

In May 2016, Red Hat commissioned Forrester Consulting to evaluate how, where, and why enterprises leverage containers in the software development life cycle, as well as the barriers that exist to their broader implementation and the realization of their maximum value.

**Respondent profile**

150 IT architecture, operations, and application development professionals at the manager level or higher with current or planned use of containers

**Top industries represented**

- › 19%: IT software/services
- › 13%: Manufacturing
- › 12%: Chemicals and metals
- › 10%: Financial services
- › 7%: Consumer products

**Geographies represented**

- › United States
- › United Kingdom
- › India
- › China
- › Germany

**Company sizes represented**

- › 14%: 500 to 999 employees
- › 37%: 1,000 to 4,999 employees
- › 28%: 5,000 to 19,999 employees
- › 21%: 20,000+ employees

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## Use Of Containers In Software Development Continues To Increase

Container technology has been around for years, but its spike in popularity for use in software development coincided with the release and rapid adoption of the Docker open source project that launched in 2014.

Given that firms must differentiate themselves through the development and delivery of more (and more complex) software at breakneck speed, IT architecture, operations, and development professionals are eager to embrace tools that help them reduce complexity and friction and shorten time-to-market.

This dynamic — community-generated excitement for a new implementation of an already-proven technology — has led to high adoption rates for containers. In the process of isolating respondents with current or planned use of containers in software development for subsequent analyses in this profile, we found that 48% of firms currently utilize containers in development, a figure projected to rise to 53% in 2017. A mere one-fifth of respondents said that they won't leverage containers in development processes next year.

What is your firm's experience with and plans for using Linux containers in your development processes?

**Among application development and IT operations organizations at midsize and enterprise companies...**

**48%**

Currently use containers in the application development and delivery life cycle.

**53%**

Will use containers in the application development and delivery life cycle within one year.

Base: 474 IT architecture, software, and operations professionals in the US, the UK, Germany, China, and India  
Source: A commissioned study conducted by Forrester Consulting on behalf of Red Hat, May 2016

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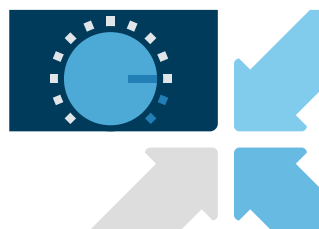
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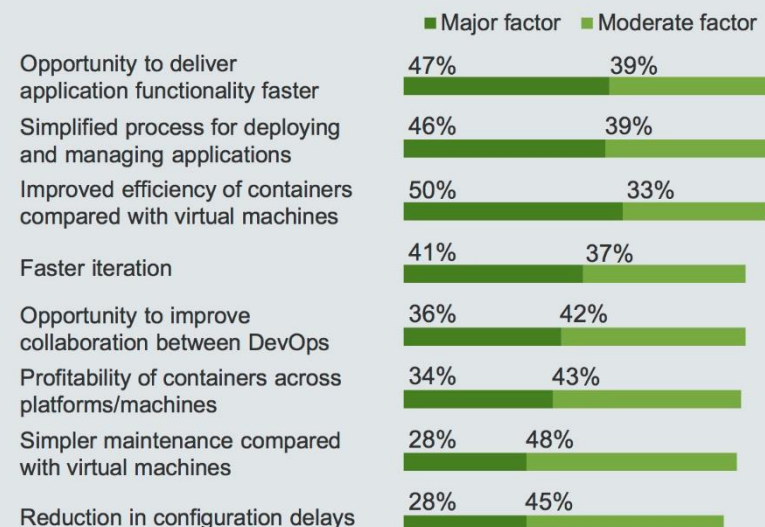
## Speed, Efficiency, And Process Simplification Lead An Array Of Container Drivers

When we asked respondents why they decided to use containers in development and measured their responses by combined mentions of major or moderate factors, we found that respondents gave top marks to containers for enabling faster delivery of application functionality and simplified processes for application management. When they made their call solely on the basis of major factors, respondents lauded improved efficiency compared with virtual machines the most.

On average, four out of five respondents rated any of the eight considerations we asked about as a major or moderate factor in their decision to leverage containers for application delivery.



To what extent have the following considerations factored into your organization's decision to leverage containers for application delivery?



Base: 151 IT architecture, software, and operations professionals using or planning to use Linux containers at companies within the US, the UK, Germany, China, and India

Source: A commissioned study conducted by Forrester Consulting on behalf of Red Hat, May 2016

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## Containers Are Leveraged Widely Across The App Development Life Cycle

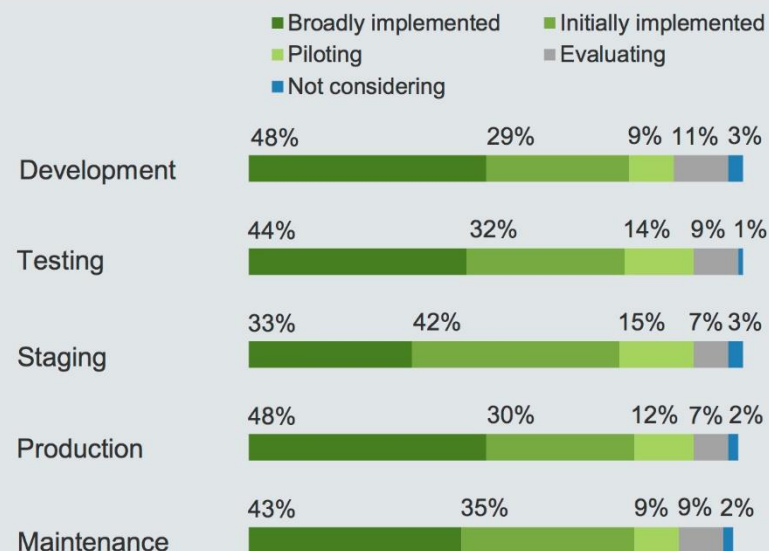
The individuals who took our survey — all of whom use containers for application software development and delivery — paint a picture of a rapidly maturing container market.

On average, 77% of respondents have implemented container use either broadly or initially in a given stage of the application development cycle, with a further 12% running pilots. An average of only 2% of respondents said they weren't at least considering containers for a given stage.

Development and production stages tie for the highest rate of broad container use, at 48%, with testing and maintenance following close behind. Thirty-three percent of respondents use containers broadly for staging.

Our study confirmed that containers are not only suitable across the application development life cycle today, but they are indeed widely deployed from development through testing and into production.

### To what extent is your organization using containers during the following stages of the application development cycle?



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(percentages may not total 100 because of rounding)

Source: A commissioned study conducted by Forrester Consulting on behalf of Red Hat, May 2016

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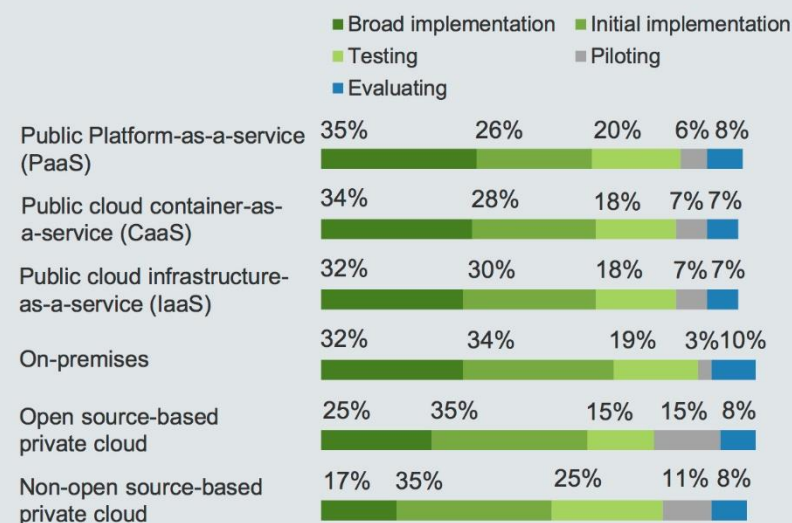
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## Firms Are Experimenting With A Range Of Container Service Delivery Models

Measured by total implementations (both initial deployments and broader deployments), firms are most likely to deploy their containers on-premises, as reported by 66% of respondents. Public cloud deployments are not far behind, however, with an average of 62% of respondents indicating broad or initial implementation of containers in public PaaS, CaaS, or IaaS environments. Among private cloud deployments, firms are more likely to choose an open source option, with 60% electing such a model, compared with 52% who said the same for non-open source options.

Regardless of which container service delivery models companies use today, they are clearly open to experimenting with various ways to consume and use containers. An average of 35% of respondents said their organization is testing, piloting, or evaluating a given container service delivery model they had not implemented, and an average of only 4% said they are not considering any given model.

### To what extent do you utilize containers in the following environments, if at all?



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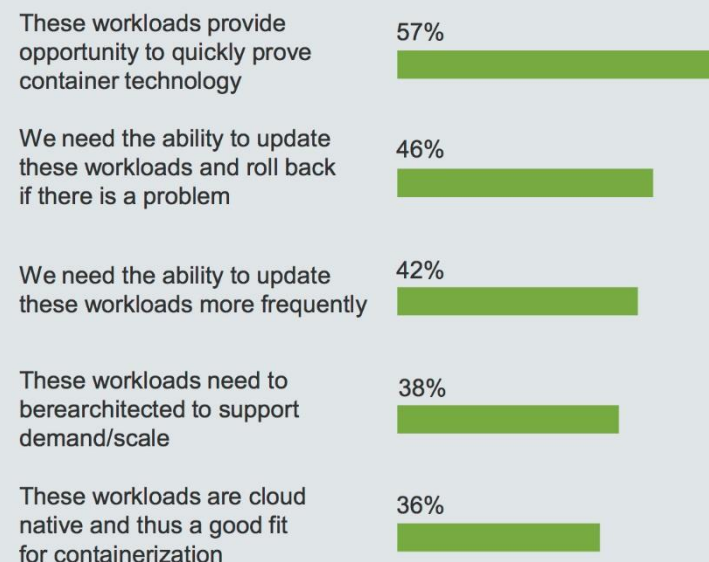
## IT Professionals Prioritize Quick-Win Containerization Projects

When asked what factors led to their decision to prioritize certain workloads for containerization, the largest share of respondents — 57% — cited the opportunity to quickly prove the value of container technology. This underscores the nascent status of containers' use in enterprise application delivery today, despite their growing popularity.

The other top reasons respondents containerize workloads mirror their most popular selling points. Forty-six percent cited the need to update workloads and roll back as needed, and 42% said the same for the need to update workloads more frequently. No fewer than one-third of respondents cited any one given reason as a motivating factor, further reinforcing that containers are useful for many types of apps and promise end-to-end benefits.



### Which of the following factors influence your decision to prioritize a workload for containerization? (Select all that apply)



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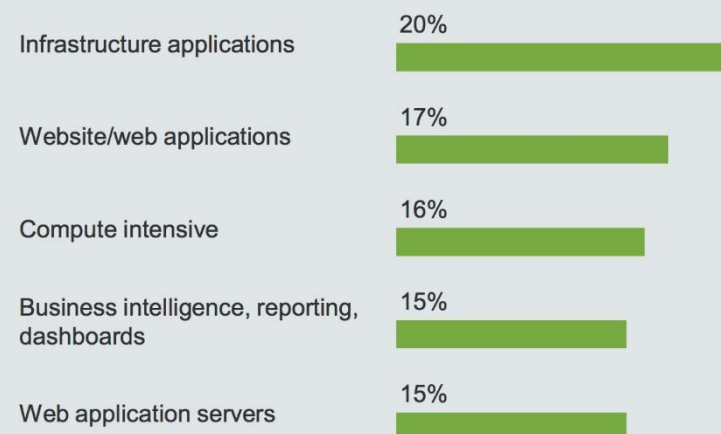
## Containers Power A Diverse Range Of Business-Critical Workloads

Survey respondents made it clear that they are not afraid to leverage containers on their most business-critical workloads. In fact, infrastructure applications constitute the most containerized workload type today.

Following closely behind on the containerization priority list are websites and web applications; compute-intensive workloads such as big data, fast data, and hyperscale applications; business intelligence, including reporting and dashboards; and web application servers.



### What types of workloads is your organization prioritizing for containerization today? (Select top three)



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Source: A commissioned study conducted by Forrester Consulting on behalf of Red Hat, May 2016



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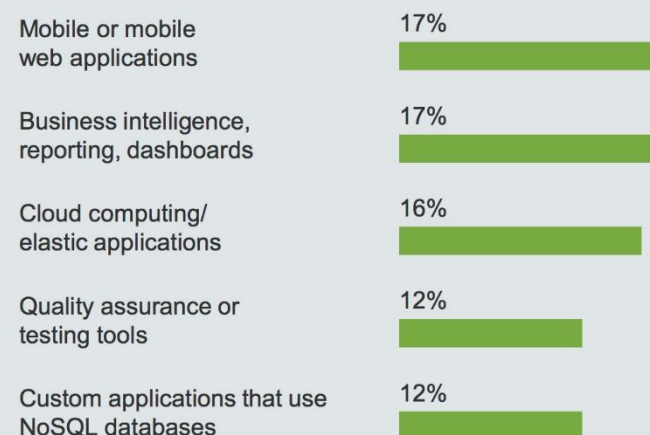
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## The Workloads Prioritized For Containerization Will Shift

As containers proliferate throughout companies' application development processes and prove their capabilities in today's top use cases, adoption is poised to soar. Their use is tightly linked to the types of modern workloads companies seek to develop quickly and efficiently to serve their digitally enabled customers — and to help their employees do so as well.

NoSQL database technology workloads — which increasingly power mission-critical applications that require unparalleled scale and speed — are projected by our survey respondents to see the largest jump in containerization over the next year (rising in prevalence from 7% today to 12% in one year, a 71% increase). Mobile or mobile web applications are anticipated to see the second greatest increase (of 42%, from 12% to 17% in one year), followed by cloud computing or elastic applications (a 23% increase, from 13% to 16%). Rounding out the top five are quality assurance or testing tools (increasing by 20%, from 10% to 12%) and business intelligence, reporting, and dashboards (increasing by 13%, from 15% to 17%).

### How do you anticipate the priority of containerization of the following workloads to change over the next year? (Top five increasingly prioritized workloads)



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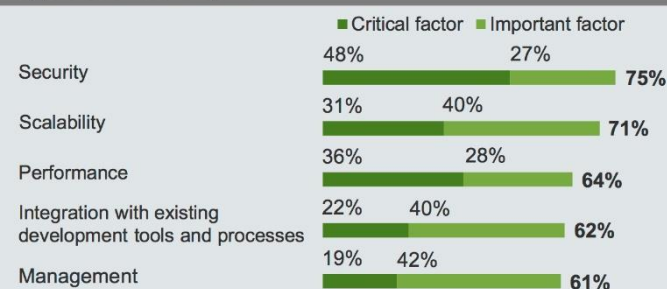
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## Technical Factors Trump Business Concerns When Firms Expand Use Of Containers

Survey respondents referred to both technical and business factors when describing what slows their organizations' use of containers, but they made it clear that technical challenges are a greater drag on their progress. An average of 66% cited one of the top five technical factors as a critical or important factor in such challenges, with an average of 31% considering the factor as critical. By contrast, an average of 52% cited one of the top five business factors as a critical or important factor, with an average of 15% classifying it as critical.

Security topped the list of technical factors slowing container use, and three-quarters of security-minded respondents claimed it to be a major concern. Scalability, performance, integration with existing tools and processes, and management concerns also topped the list of perceived technical limitations of containers.

### What are the top technical factors that prevent your organization from expanding its use of containers during application development?



Base: 151 IT architecture, software, and operations professionals using or planning to use Linux containers at companies within the US, the UK, Germany, China, and India

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### What are the top business factors that prevent your organization from expanding its use of containers during application development?



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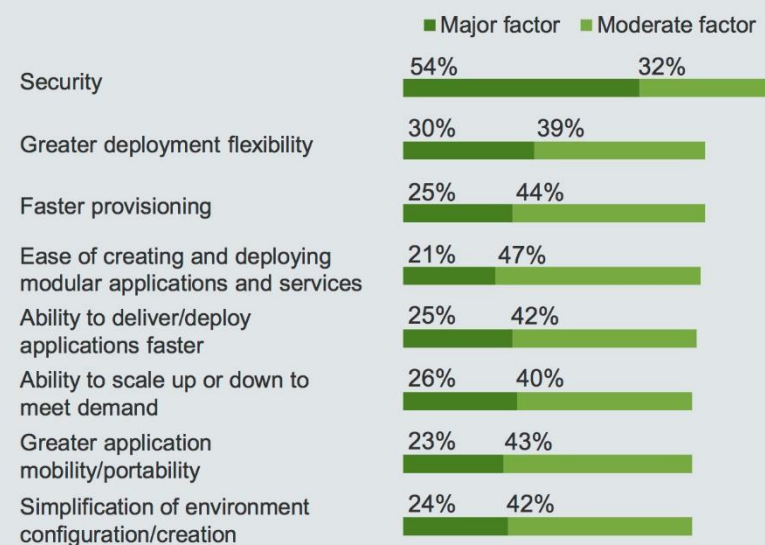
## Buyers Seek Secure, Flexible, And Fast Container Technologies

Given the degree to which security is a factor holding companies back from expanding container use, it's no surprise that survey respondents overwhelmingly cited security as the most important capability needed in a container-optimized technology stack (cited as critical or important by 86%).

Organizations leveraging containers also consider deployment flexibility (multiple deployment options supported), fast provisioning, and easy creation and deployment of modular applications and services to be very important features. In fact, no fewer than two-thirds of respondents cited any of the top eight qualities of a container-optimized stack as critical or important.



### How important, if at all, are the following capabilities of a container-optimized technology stack?



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## Conclusion

Driven by an array of factors — led by improvements in the speed, efficiency, and simplicity of software development — firms across industries are eager to implement Linux containers across the software development life cycle. In fact, a majority of professionals involved in application development and infrastructure and operations at enterprises in the US and the UK are projected to leverage containers within the next year.

While on-premises and public cloud implementations are the most popular container deployment models, widespread experimentation with various environments — including open source private clouds — demonstrates how firms are in the process of determining which container approach is right for them. And as application development and infrastructure and operations professionals complete their demonstrations of containers' value through carefully selected use cases, their expansion of the technology into new, more complex workloads is projected to soar.

Yet despite the enthusiasm around containers, there are both technical- and business-related stumbling blocks that curb the full realization of their potential. To combat these challenges, container-savvy organizations seek solutions that maximize container benefits while ensuring security, scalability, and consistent performance.

## METHODOLOGY

To create this profile, Forrester Consulting designed and fielded a custom survey of enterprise IT professionals in the US, UK, India, China, and Germany. Respondents were required to currently use container technology in software development, or be planning to do so within one year. The research was completed in May 2016.

### ABOUT FORRESTER CONSULTING

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