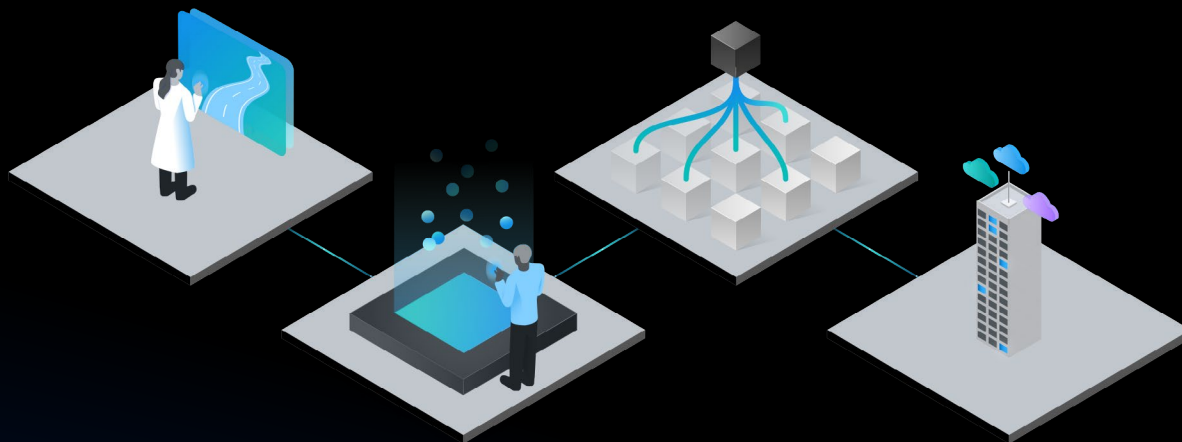


IBM IT Infrastructure

# Building a seamless hybrid cloud for critical workloads

Explore IBM Power Systems with Red Hat and IBM Cloud Pak Solutions



IBM

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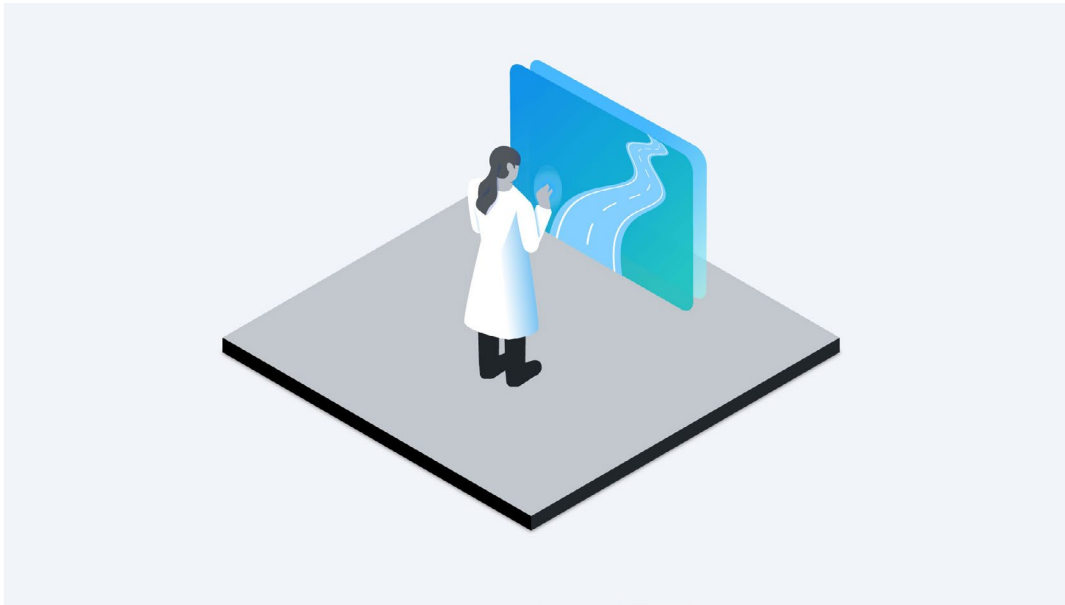
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## Chapter 1

# See where business is going: Get ready for the road ahead



The pandemic has accelerated ten years of digital transformation into one.

In this fast-moving climate, your organization must secure sensitive data and workloads, support new applications, and deliver consistency and simplicity across the enterprise. Red Hat® OpenShift® and IBM Cloud® Pak® solutions on IBM Power Systems™ help you achieve these goals.

# Transform with the enterprise engine of IBM Power



With this combination of IT infrastructure and modern cloud-native solutions, you can develop, run, and manage applications and workloads consistently across hybrid cloud. As business and workload demands change, you can move critical services and optimize them in the environment of your choice.

Learn how you can:

1. Spur innovation and transformation by modernizing traditional applications with containers.
2. Reduce data latency and improve application environment consistency by co-locating data and workloads.
3. Keep customers satisfied and business running smoothly by extending on-premises security and resiliency to hybrid cloud.

# Modernize with containers:

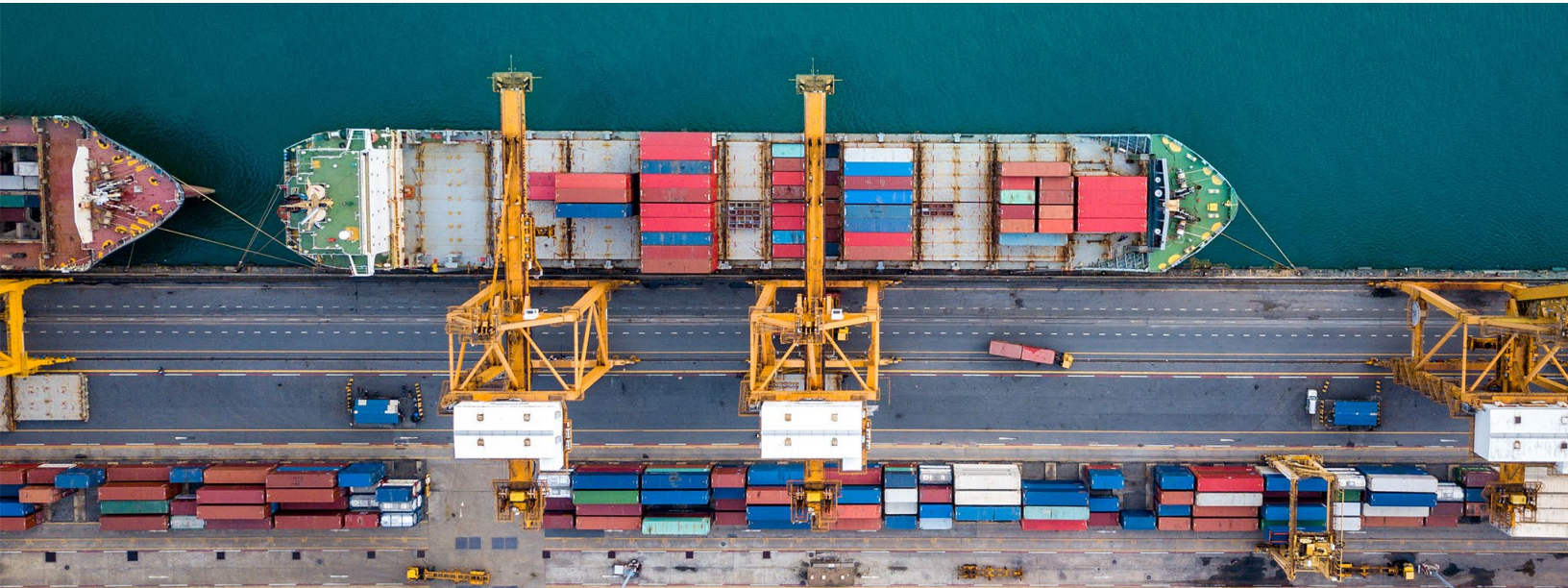
## Move faster by modernizing core apps



Traditional applications are the backbone of many enterprises. **Modernizing these applications can help accelerate release frequency by up to 10x**, improving operations, customer engagement and time to market.<sup>1</sup>

Allocating resources and processes to fully modernize these apps may seem daunting. But it's straightforward to get started on your current Power Systems platform.

# Modernize at your pace

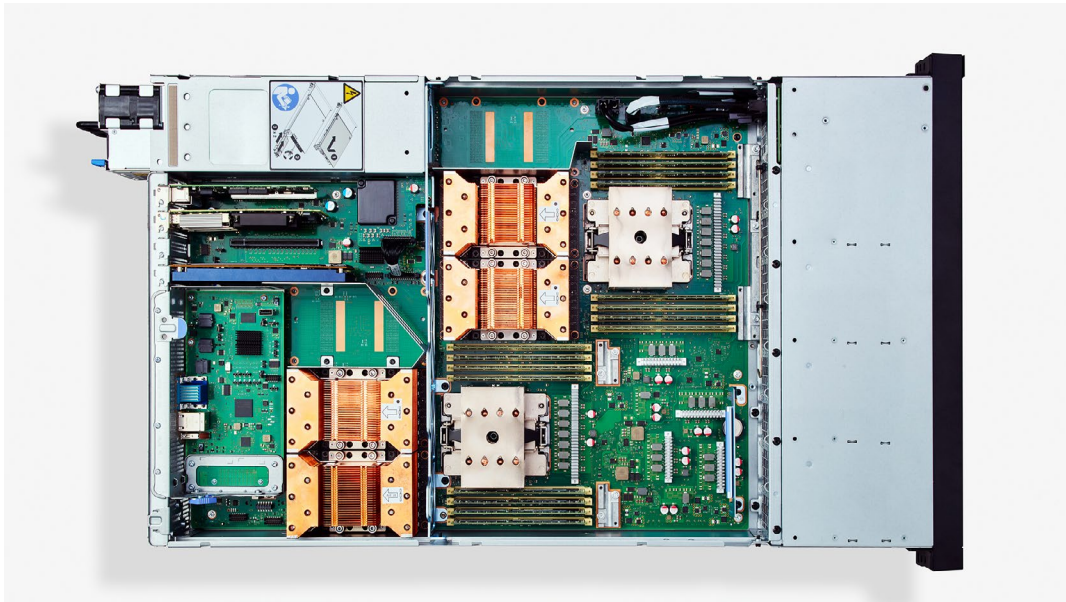


With Red Hat OpenShift on IBM Power Systems, you can incrementally modernize applications by surrounding them with containers. Gain many benefits of app modernization with much less complexity and cost.

As your app modernization journey advances further, you can refactor apps into containerized microservices.

This paves a path to more portable applications across your hybrid cloud and more frequent software updates through DevOps practices.

# Innovate efficiently with containers on Power and OpenShift



IBM Power Systems runs containers more efficiently and delivers better price performance compared with x86 systems.

**You can run 3.2x more containers per core at 2.6x better price performance with IBM Power Systems and Red Hat OpenShift.<sup>2</sup>**

## Evaluate your modernization options



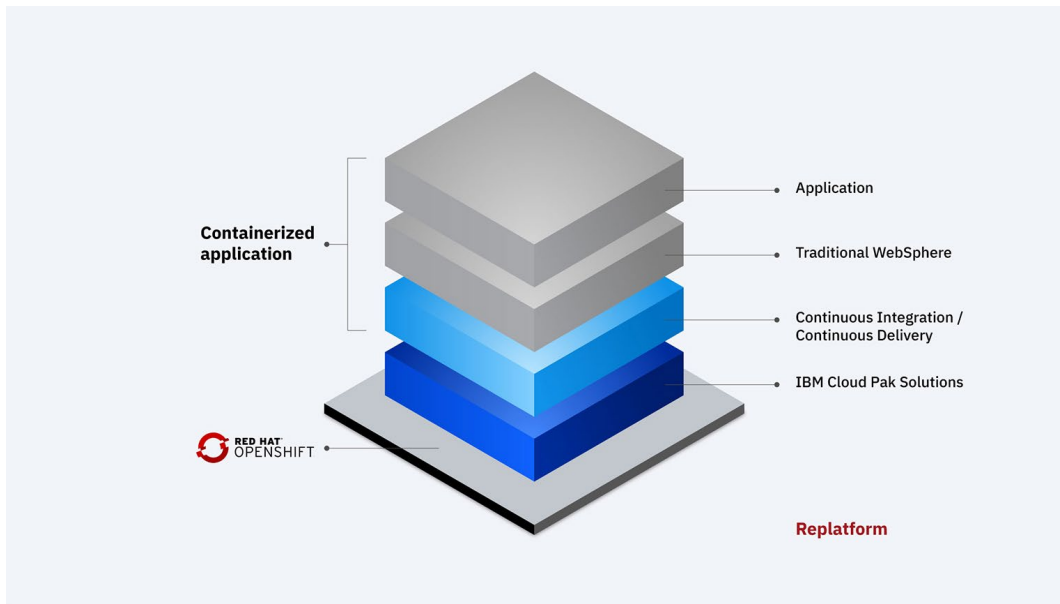
Modernizing incrementally gets you quick wins across hybrid cloud while delivering significant business advantages. Choose to:

- **Replatform**
- **Repackage**
- **Refactor**
- **Combine the three**

This roadmap can help you adopt Agile DevOps practices, increase developer velocity and promote integrated management and automation.



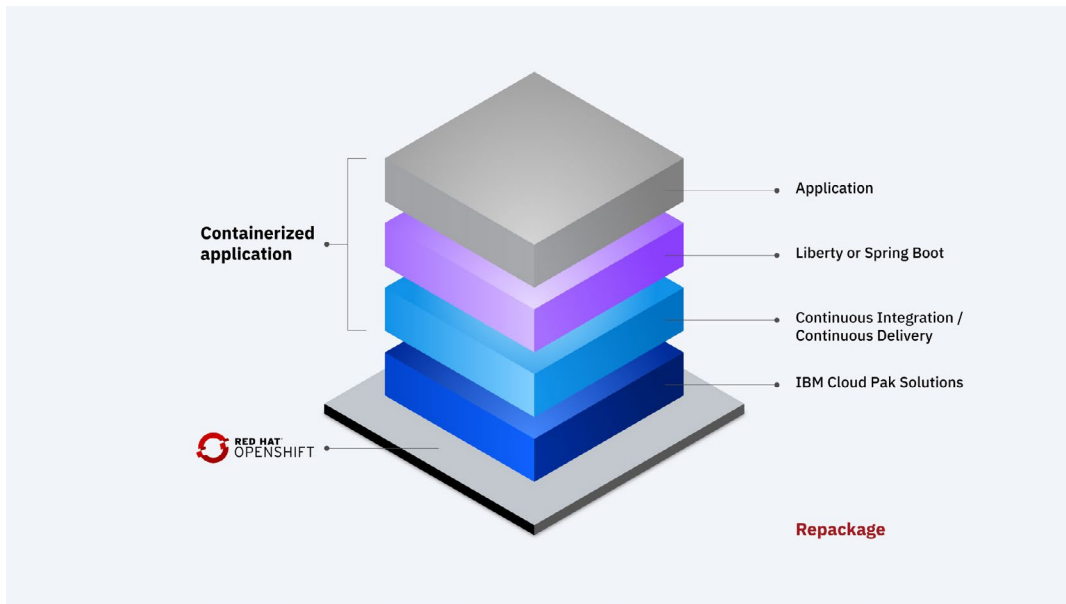
# Replatform the application



Red Hat OpenShift lets you lift existing applications off their current platforms and onto an IBM Power Systems environment, either on premises or on a public or private cloud.

Replatforming an app gets your developer teams immediate access to Continuous Integration and Continuous Delivery (CI/CD) pipelines featuring the inherent security of IBM Power Systems.

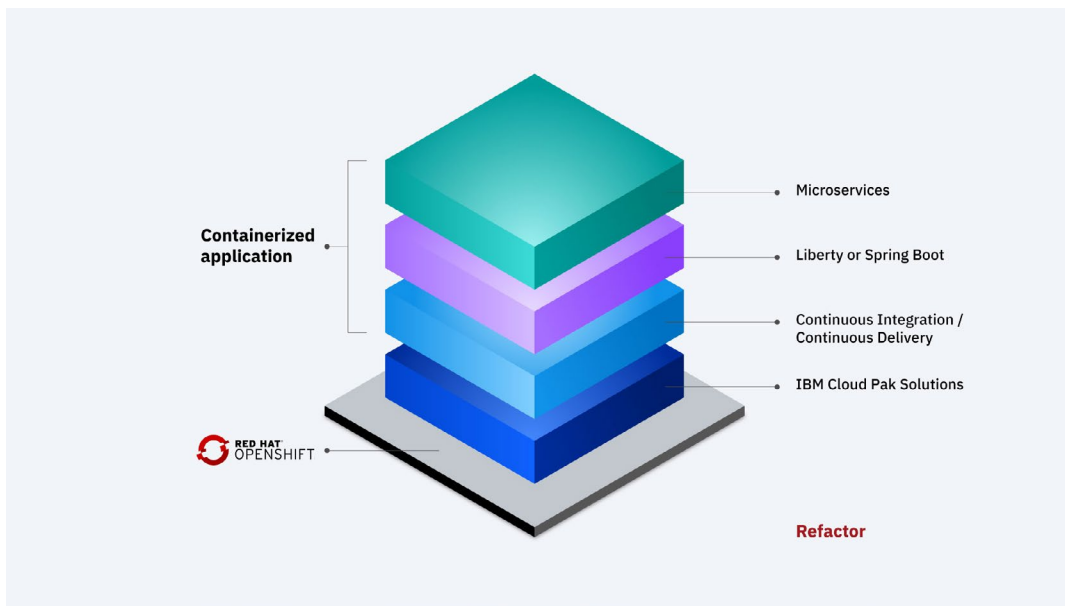
# Repackage the application



After replatforming, your developer teams can use Red Hat OpenShift on IBM Power Systems to move their integrated development environments (IDEs) into preferred open-source frameworks such as [Liberty](#) and [Spring Boot](#).

The result can be a faster, more consistent way to create innovative cloud-native applications.

# Refactor the application



The final step in modernization is to refactor the application into microservices.

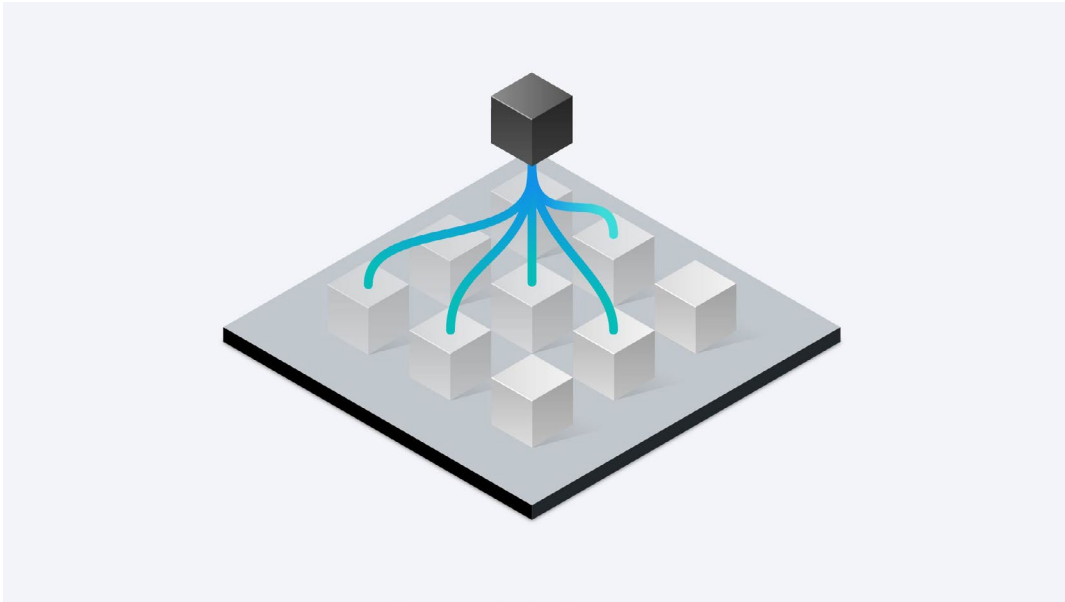
With [IBM Cloud Pak for Applications](#) and [IBM Cloud Transformation Advisor](#), you can create modular and portable containerized applications that are highly flexible anywhere you need them.

[Free e-book: dive deeper into app modernization →](#)

[Read Forrester's take on IBM and Red Hat leadership →](#)

# Co-locate for speed and consistency:

Bring applications and users closer together



Here's how to trade data latency for data gravity.

Start by co-locating high-performance computing workloads with high-value data on IBM Power Systems, on premises or on your private cloud. Then place applications closer to end users with containers using Red Hat OpenShift, typically on public cloud.

Data and application components can travel with unified protection and standards across your hybrid cloud. Compared to storing data and running workloads among disparate cloud vendors, co-location can significantly increase efficiency and reduce risk.

## Modernize consistently across operating systems

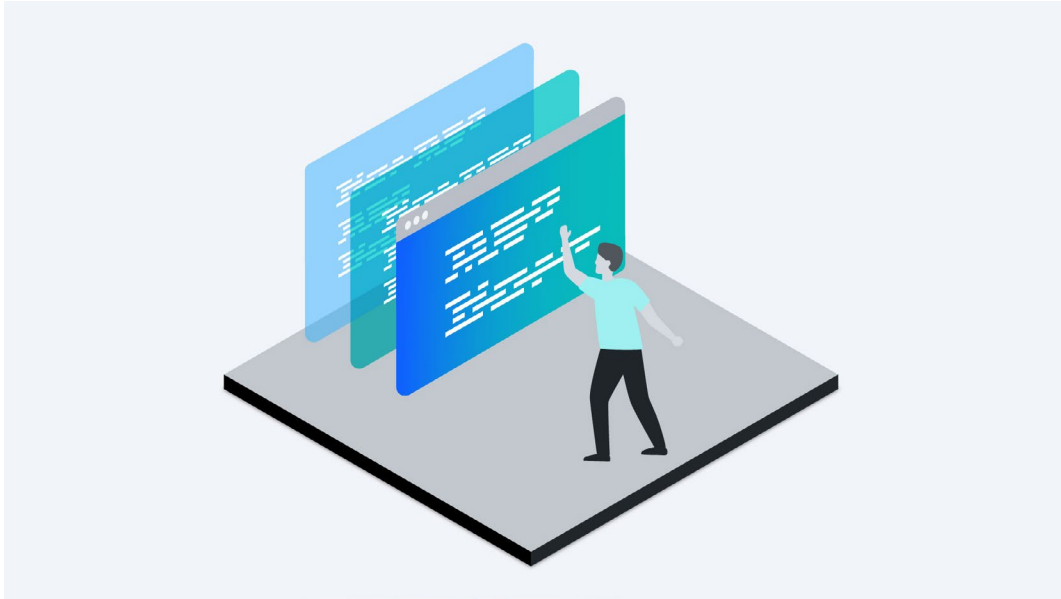


Your business relies on IT infrastructure, both hardware and software (including operating systems). Red Hat OpenShift on IBM Power Systems allows you to continue to support both, now and into the future.

With IBM Power Systems Virtual Servers on IBM Cloud, your developers can modernize applications for IBM i, IBM AIX®, Linux®, LPARs and more. Containers managed through Red Hat OpenShift then let you build once and deploy anywhere.

This creates a uniform, consistent AppDev environment for your business, increasing efficiency and speeding time to market.

## Create a culture of innovation

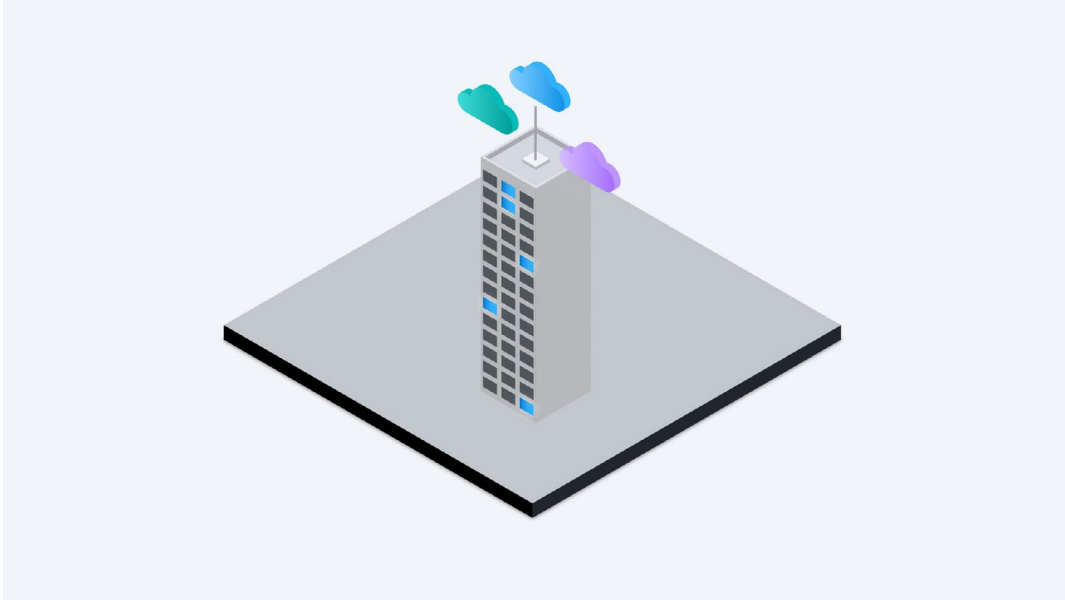


Open source thrives on collaboration and promotes compatibility. Now, get a truly integrated hybrid cloud approach where IBM Power Systems applications run alongside those built cloud natively through Linux on Red Hat OpenShift.

And with IBM Cloud Pak capabilities, you can improve visibility, automation and governance for application and infrastructure management across hybrid cloud.

It's how you build a continuous, modernized ecosystem of on-premises and cloud applications now — and for the future.

# Extend Power Systems benefits: Bring cloud providers together

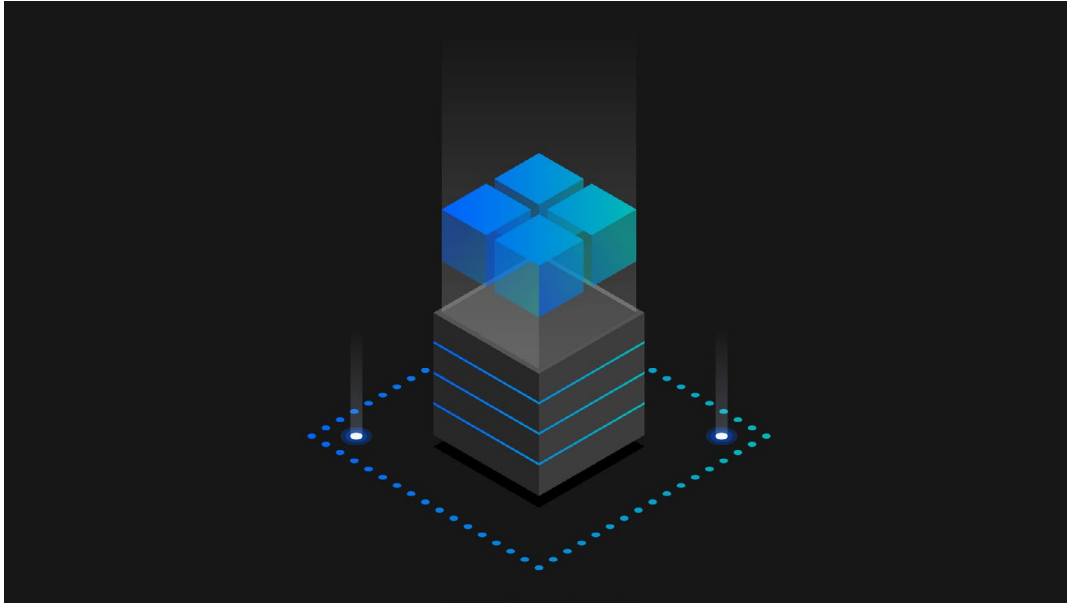


Most hybrid cloud environments are comprised of different public and private cloud providers. Red Hat OpenShift and IBM Cloud Pak Solutions on IBM Power Systems help unite them.

IBM Power Systems protects the entire stack: from the processor and firmware to the hypervisor, operating system and system management. Red Hat OpenShift enhances protection with Kubernetes security traveling with containers wherever they go.

Adding IBM Cloud Pak Solutions then unifies and centralizes hybrid cloud management. This helps avoid vendor “lock-in by design” while promoting interoperability as data and microservices travel between clouds seamlessly.

## Easily deploy IBM software anywhere



With IBM Cloud Pak solutions, you can deploy IBM software on premises with IBM Power Systems and across public and private clouds.

Across application, data, integration, automation, multicloud management and security needs, each solution includes containerized IBM middleware and common software services on top of a common integration layer. In operating system environments such as IBM AIX and IBM i, this helps you speed application development, reduce operational expenses, and improve productivity and performance.



# Keep business moving



Resiliency has never been more important. Together, IBM Power Systems and Red Hat OpenShift help you maximize systems availability and respond quickly to rapidly changing customer needs.

And with Red Hat OpenShift you can scale quickly from pilot to production environments, bringing innovation and modernization to hybrid cloud operations.

**For additional information, please contact your IBM Representative or IBM Business Partner.**

# References

## Notes

1 A commissioned study conducted by Forrester Consulting, "Emerging Technology Assessment: The Total Economic Impact™ Of Using Both IBM And Red Hat Solutions Together." June 2019.

2 Based on IBM internal testing running MongoDB's Geospatial queries at 700 users, each running 1000 transactions using jmeter v4. Each container uses MongoDB 4.0.2 & Node.js v8.14.1 (REST APIs) with socket bound containers. Testing added containers to each server until servers reached response time limit of 99% of transactions completing in under 1 second. Results valid as of 7/16/19. Conducted under laboratory condition with speculative execution controls to mitigate user-to-kernel and user-to-user side-channel attacks on both systems, Individual result can vary based on workload size, use of storage subsystems & other conditions.

Details about MongoDB workload: <https://docs.mongodb.com/manual/tutorial/geospatial-tutorial/>

3 2X greater containers/core is based on 174 containers/20 cores for Power L922 and 98 containers/36 cores for Intel Xeon. –  $(2,531/20)/(2,290/36) = 3.2$

2.6X Better price performance is based on \$666/container for Power L922 and \$1,762 for Intel Xeon -  $1747/666 = 2.6$ . IBM Power L922 (2x10-core/typical 2.9 GHz/256 GB memory) 2x 388 GB SSD, 2x 10 Gb two-port network, RHEL 7.6 with PowerVM (2 partitions@10-cores each), Competitive stack: 2-socket Intel Xeon Skylake Gold 6150 (2x18-core/ 2.7 GHz/256 GB memory), 2 x 480 GB SSD, 3 x 10 Gb two-port network, RHEL 7.6, KVM (2 VMs@18-cores each)

Pricing is based on Power L922 <https://www.ibm.com/it-infrastructure/power/scale-out, and publically available x86 pricing> <https://ark.intel.com/content/www/us/en/ark/products/>

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