IBM Cloud Paks and Red Hat OpenShift on IBM Power Systems

OHIO LINUXFEST 2019
November 1-2 at the
Hyatt Regency Columbus, Ohio

Jim Smith
IBM Cloud / Cognitive Infrastructure
Client Technical Specialist
IBM Systems

What is Hybrid Multicloud?

Hybrid Cloud

A hybrid cloud is a computing environment that **combines a private cloud and a public cloud** by allowing **applications and data to be shared** between them.

Multicloud

Multicloud is a cloud approach made up of **more than one cloud service**, from **more than one cloud vendor—public or private**.

Hybrid Multicloud = Hybrid Cloud + Multicloud

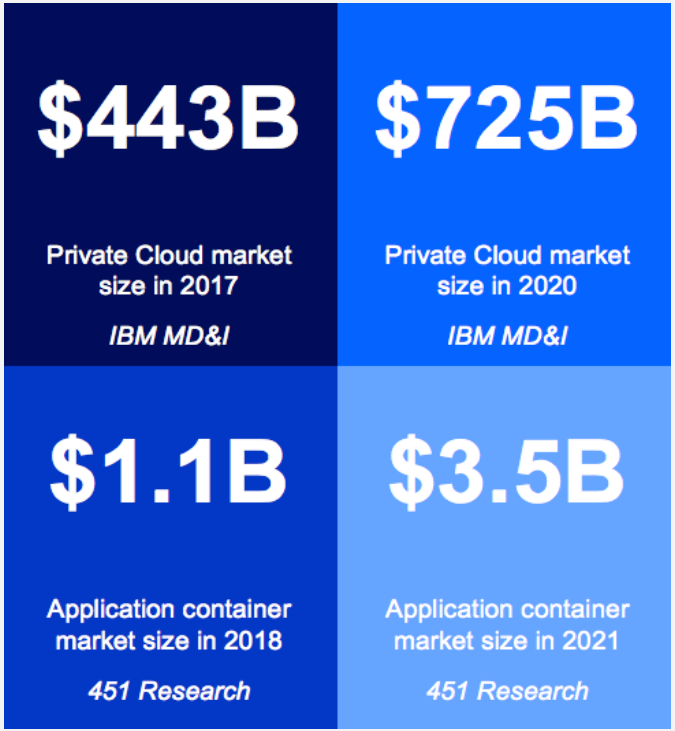
A hybrid multicloud combines a private cloud, a public cloud and more than one cloud service, from more than one cloud vendor.

80%

of organizations have migrated apps or data from public cloud to on-premises or private cloud

Source: https://www.crn.com/businesses-moving-from-public-cloud-due-to-security-says-idc-survey

Enterprises are deploying on-premises clouds and containers as a foundation for hybrid cloud strategies



Digital transformation requires apps to be easy to develop and deploy anywhere at cloud scale

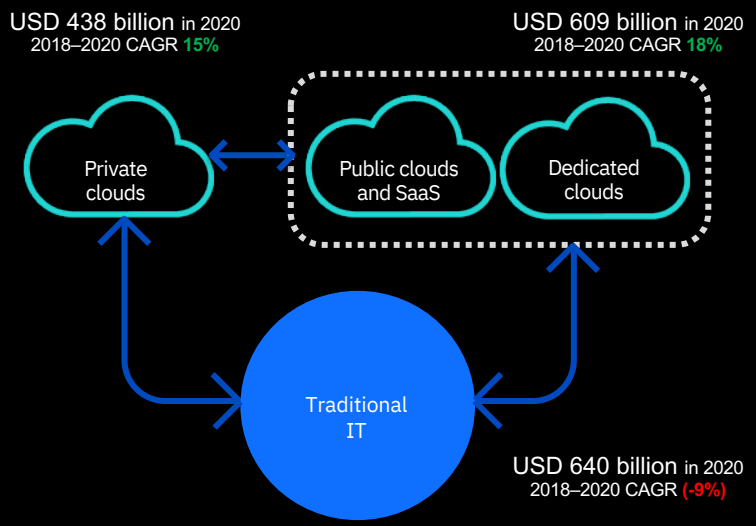
Businesses uniquely evolve on their cloud and digital transformation journey. Clients often are forced to span multiple public and private clouds, which must be integrated to achieve the agility and speed that enterprise demands.

Modernizing apps with micro-services and new software technologies to seamlessly run apps and access data from anywhere is painful without automating cloud infrastructure:

- Agile DevOps require new applications built using the latest software approaches vs. traditional waterfall
- Deploying apps across multiple architectures in a repeatable, continuous DevOps model is challenging
- Delivering breakthrough insights via AI model-driven insights requires accelerated platforms for faster results

As a result, organizations are struggling to integrate their multiple on-premises private clouds— where business critical apps and most of their data resides —with their public clouds.

Hybrid multicloud has arrived

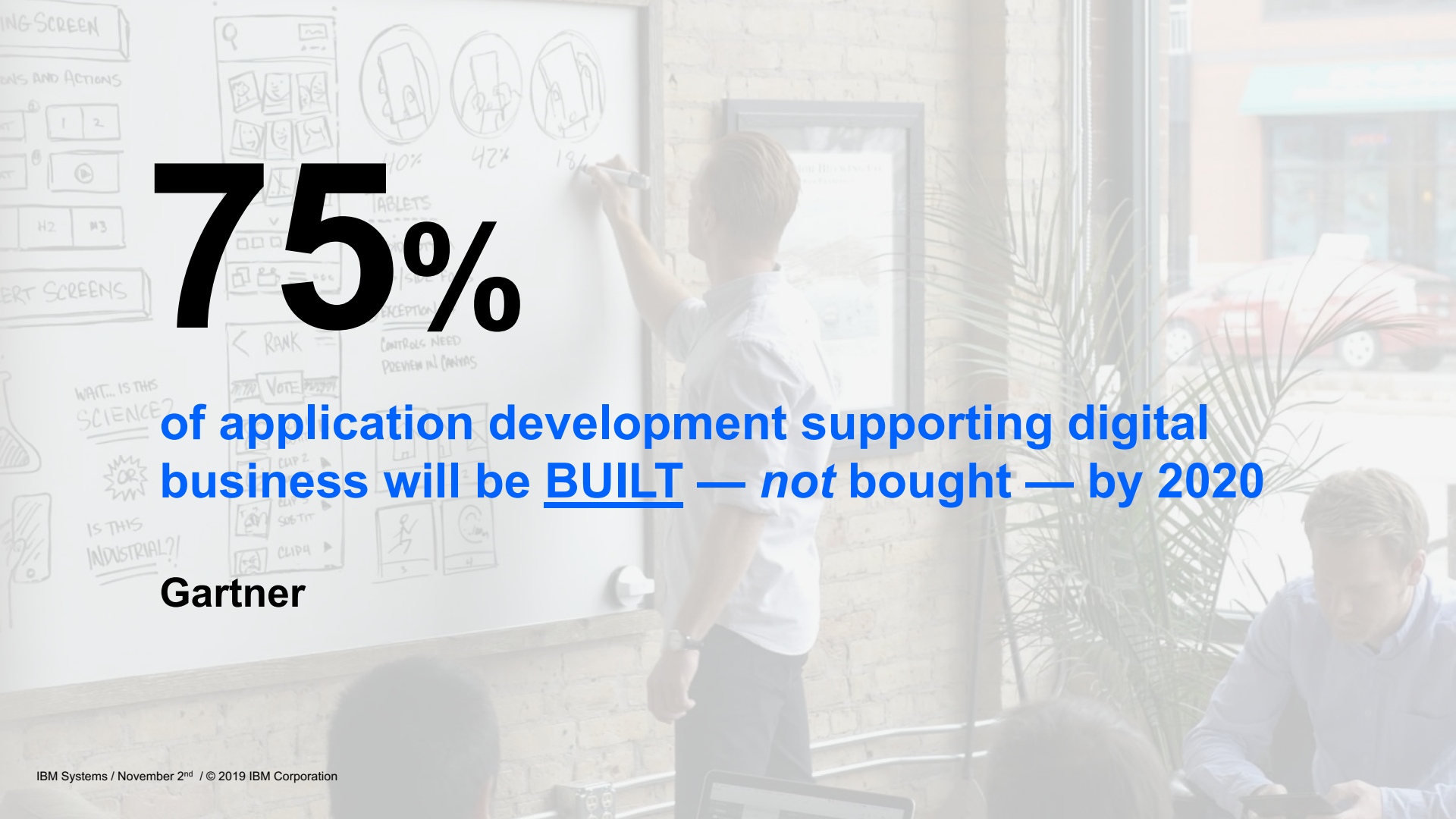


A real-world look at multicloud

94% Share of enterprises using a mix of cloud models

67% Share of enterprises using more than one public cloud provider

Movement between clouds	73%	priority concern
Connectivity between clouds	82%	priority concern
Consistency of management	67%	priority concern



75%

of application development supporting digital business will be BUILT — *not* bought — by 2020

Gartner

A Hybrid Multicloud-enabled Data Center supporting Heterogeneous Cloud Infrastructure

Manage entire Hybrid Multicloud

IBM Multicloud Manager

The enterprise-grade multicloud management solution for Kubernetes

Manage Public Cloud Apps

Red Hat OpenShift — RED HAT OPENSHIFT Container Platform — kubernetes — IBM Cloud Pak for Multicloud Mgmt.

IBM Cloud and others…

Choice of public cloud provider(s)

IBM Cloud · aws · Azure · Google Cloud · Edge · Private · Systems

Manage IBM Z Apps

Red Hat OpenShift (coming soon…) — RED HAT OPENSHIFT Container Platform — kubernetes — IBM Cloud Pak for Multicloud Mgmt.

IaaS

Manage x86 Apps

Red Hat OpenShift — RED HAT OPENSHIFT Container Platform — kubernetes — IBM Cloud Pak for Multicloud Mgmt.

vmware · redhat · openstack.

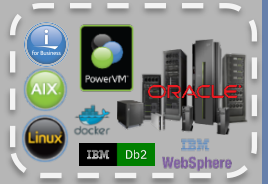
Choice of Intel x86 servers from HP, Dell, Cisco, Lenovo, etc.

Manage IBM POWER Apps

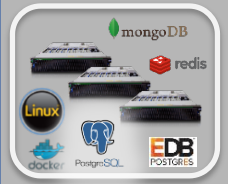
Red Hat OpenShift — RED HAT OPENSHIFT Container Platform — kubernetes — IBM Cloud Pak for Multicloud Mgmt.

PowerVC · redhat · openstack.

Cloud Ready Enterprise Power E, C and L



Scale-out Cluster/Cloud Power AC and LC



Challenges to business

“Applications and code lack portability.”

- Studies show that moving all applications to a public cloud is usually not the most cost efficient or business effective approach
- Patterning development on proprietary APIs increases the risk of lock-in — with difficult and costly application refactoring being the only way out
- Enterprises require frictionless movement across both private and public clouds (interchangeably)

“Information architecture across vendors is inconsistent.”

- Organizations need to support the complete build-test-deploy pipeline for any private infrastructure that their business runs on
- Application design and workload planning shouldn’t need bespoke code for each infrastructure vendor you deploy with
- Your business needs a way to abstract duties between container workloads, the underlying OS, and the hardware that runs it

“Deployments and growth are unpredictable.”

- When clients deploy software, sometimes things go wrong — users may inadvertently change configurations or they mis-tune their environment
- Enterprises require containerized environments that are immutable and consistently deployed
- Repeatable patterns emerge from this type of deployment model, allowing projects to scale in a predictable and consistent way

Red Hat + IBM Solution

Red Hat OpenShift

- Over half of all cloud workloads run on Linux today, and Red Hat is the world's number one distributor and support provider of Linux
- Kubernetes is central to IBM and Red Hat's combined hybrid cloud strategy for deploying and managing containerized apps
- Together, IBM and Red Hat can provide end-to-end solutions that allow clients to unify private and public cloud investments for their applications and services

IBM Cloud Paks on Power Systems

- Accelerate digital transformation by unleashing the open innovation of Red Hat, IBM Software, and Power Systems
- The joint solutioning of Red Hat OpenShift and IBM Cloud Paks on Power Systems allows our clients to rapidly boost the productivity of data scientists, developers, administrators, and line of business users within a cohesive platform fabric
- This offering has been optimized specifically for IBM Power Systems infrastructure for the highest-performance AI workloads on the world's most cost-efficient and resource-dense servers

redhat

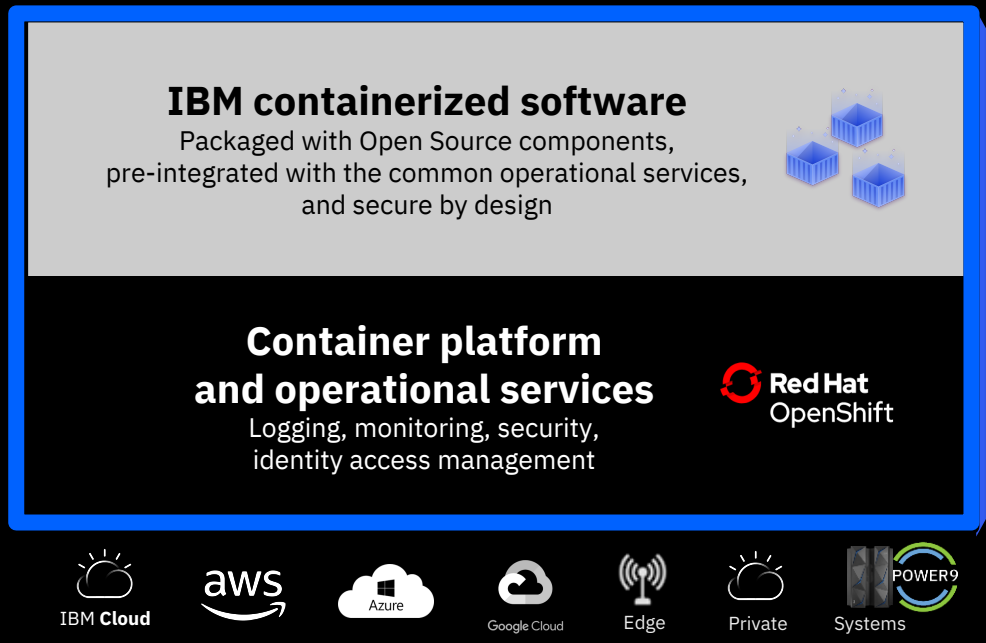
"We believe that Red Hat Enterprise Linux, combined with the latest generation of IBM Power Systems, provides an excellent choice for enterprise environments seeking **impactful solutions** that optimize performance and bring openness, choice and flexibility."

Jim Totton

Vice President
Platform Business Unit
Red Hat

Cloud Paks – Enterprise-ready containerized software

A faster, more secure way to move your core business applications to any cloud through enterprise-ready containerized software solutions



Complete yet simple
Application, data and AI services, fully modular and easy to consume

IBM certified
Full software stack support, and ongoing security, compliance and version compatibility

Run anywhere
On-premises, on private and public clouds, and in pre-integrated systems

Application Modernization with IBM Cloud Paks

Cloud Pak for Applications

WAS
WAS ND
Open Liberty
Kabanero Enterprise
JBoss
WAS Liberty
Istio
Jenkins
Nginx
Node.js
Kitura.js
Swift
React
Transformation Advisor
Spring
*UrbanCode Deploy
*Developer Team Orch
*Dev Team Governance
IBM Mobile Foundations
RHOAR - OpenShift Application Runtimes
+ Add-on *

Red Hat OpenShift

Cloud Pak for Data

Cloudant
DB2
Data Virtualization
Cognos
Streams
MongoDB
MariaDB*
Redis*
etcd

* PostgreSQL
* NetApp Persistent Storage
* Wand Taxonomies and Ontologies
* Knowis for Banking
* Lightbend Reactive Microservices
* Prolifics Prospecting Accelerator

+ Add-on * (including Watson AI, ...)

Red Hat OpenShift

Cloud Pak for Integration

App Connect Enterprise
API Connect
DataPower
Event Streams
MQ
Aspera
RabbitMQ
Integration Explorer
Watson Voice Gateway *
+ Add-on *

Red Hat OpenShift

Cloud Pak for Automation

Business Automation Workflow
Operational Decision Management
Business Automation Insight
Business Automation Content Analyzer
File Connect Manager
Robotic Process Automation *
+ Add-on *

Red Hat OpenShift

Cloud Pak for Multicloud Management

Multicloud Manager
Cloud Application Management
Cloud Event Manager
Cloud Automation Manager

Red Hat OpenShift

Runs on choice of IBM Power Systems Infrastructure-as-a-Service (IaaS)

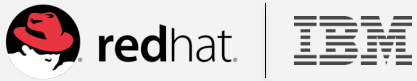
PowerVC
PowerVM

Linux
AIX
i for Business

RED HAT ENTERPRISE VIRTUALIZATION
KVM
Linux

Bare-metal

Red Hat OpenShift and IBM Cloud Paks on Power Systems



Accelerate digital transformation by unleashing the open innovations of Red Hat, IBM Software, and IBM Power Systems.

Continuously deliver innovative client experiences while reducing development time, operational expense, and cloud infrastructure costs.

Key Capabilities

- Enterprise-grade, full-stack cloud solutions that dramatically reduce development time and operational expenses
- Next generation client experience apps that drive digital transformation
- Hybrid cloud agility, economics, and resiliency
- Faster AI driven insights continuously infused into cloud native apps

Benefits

- Deliver next gen client experience apps that drive digital transformation
- Develop, run, and operate cloud native apps with full control of Kubernetes on Power Systems (bare-metal, KVM, PowerVM)
- Accelerate performance of AI workloads by training models 4x faster
- Do more with less cloud infrastructure using 3.6x more containers per core

Details

- Joint solution with Red Hat and IBM Software uniquely optimized for IBM Power Systems cloud infrastructure-as-a-service
  - Red Hat Enterprise Linux, optimized for POWER9
  - Red Hat OpenShift
  - Red Hat Virtualization
  - IBM Cloud Paks
  - PowerVC / PowerVM
  - POWER9 Enterprise and Scale-out Servers

How can IBM help?

Massachusetts Open Cloud

Red Hat OpenShift and IBM POWER9 Systems are delivering an **Open Cloud Exchange (OCX) of AI and Machine Learning** services to researchers and companies across New England.

Data scientists, engineers, analysts, and knowledge workers are able to coalesce around a single open platform for big data insights. Red Hat OpenShift's containerized environments on IBM POWER9 are ideally suited to **consistent, repeatable deployment patterns** needed for scientific research.

BOSTON UNIVERSITY

MASSACHUSETTS TECHNOLOGY COLLABORATIVE

HARVARD UNIVERSITY

MGHPCC
MASSACHUSETTS GREEN HIGH PERFORMANCE COMPUTING CENTER

Massachusetts Institute of Technology

Northeastern

UMassAmherst

OPENSHIFT POWER9

"We knew a public cloud built on open source technology would let many entities operate the cloud together, offer innovative new services, and even build on top of each other's services."

Orran Krieger

Project Lead
Massachusetts Open Cloud

MOC

Why an IBM + Red Hat solution stands apart

Hybrid Cloud Agility, Enterprise Resiliency

Accelerate time to market, optimize performance, cut costs, and build skills across on-premises and off-premises clouds.

Integrate traditional and modern cloud-native applications on resilient, enterprise-grade servers with 99.999%* uptime.

Consume with Cloud Economics

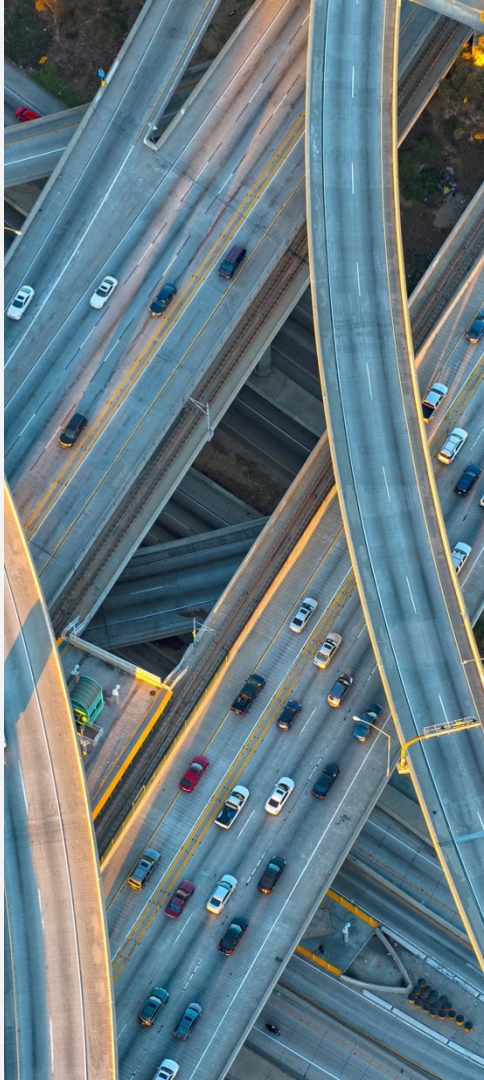
Reduce application development time by up to 84% and operational expenses by up to 75%.

IBM cloud-enabled servers are capable of running 3.6x more containers per core, enabling high container density for the most efficient use of your infrastructure's resources.

Boost Dev & Data Science Productivity

Train 4x as many deep learning models per hour on GPU-accelerated POWER9 servers vs. commodity x86 servers.

Dynamically infuse advanced algorithms into cloud native applications and data science workflows, including: Distributed Deep Learning (DDL), Large Model Support (LMS), and more.



Value to your business

Build Once, Run Anywhere

- Today you can leverage Red Hat OpenShift's deployment engine and operational management across all of IBM's comprehensive IT estate (Power, Z, and x86)
- 3x more containers running per core for clients using OpenShift on Power than OpenShift on x86
- Enterprise class servers with the latest container management and 99.999% uptime you need for mission-critical workloads

Information Architecture for Artificial Intelligence

- IBM AI software, such as WML-A and WML CE run on RHEL — a compelling opportunity for IBM Power Systems clients
- IBM POWER9's architecture is optimized to make full use of the CPU and GPU resources available within clustered systems, scaling upwards of 256 GPUs with 88% efficiency; comparatively, other competing distributed deep learning struggles to scale beyond a single server

Differentiated Hardware, Optimized for AI

- RHEL has been optimized for IBM Power systems, built on 20 years of joint development
- Train AI and deep learning models nearly 4x times faster using Power AC922 systems than Intel x86 systems (as well as 5.6x I/O bandwidth and 2.6x more RAM than equivalent x86 systems)
- NVLINK 2.0 for breakthrough GPU-CPU bandwidth, distributed deep learning, and memory sharing for larger model sizes

Cloud has reset expectations

Self-service user experience, from anywhere

Pay as you go for what you use

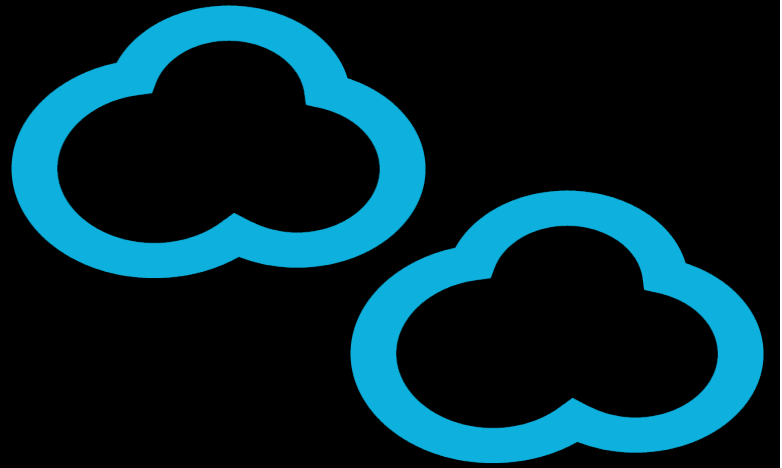
Rapid access to resources – compute, storage, GPUs, network bandwidth

Deploy and scale apps rapidly – on demand

Simplified management and operations

Continuous software, infrastructure innovation

Cloud is a capability and not a place



94% of organizations are using a mix of public and private clouds and are embracing a multicloud strategy

IDC Cloud Forecast 2018-2020

IBM Cloud Journey Workshops

Take the Next Step

- Schedule a Power Cloud e-Briefing
- Setup an Onsite Discovery Workshop
- Let Us Host a Design / Co-creation Workshop
- Join Us for a Cloud Garage Workshop

For assistance on the Journey to Cloud, Contact Us Today

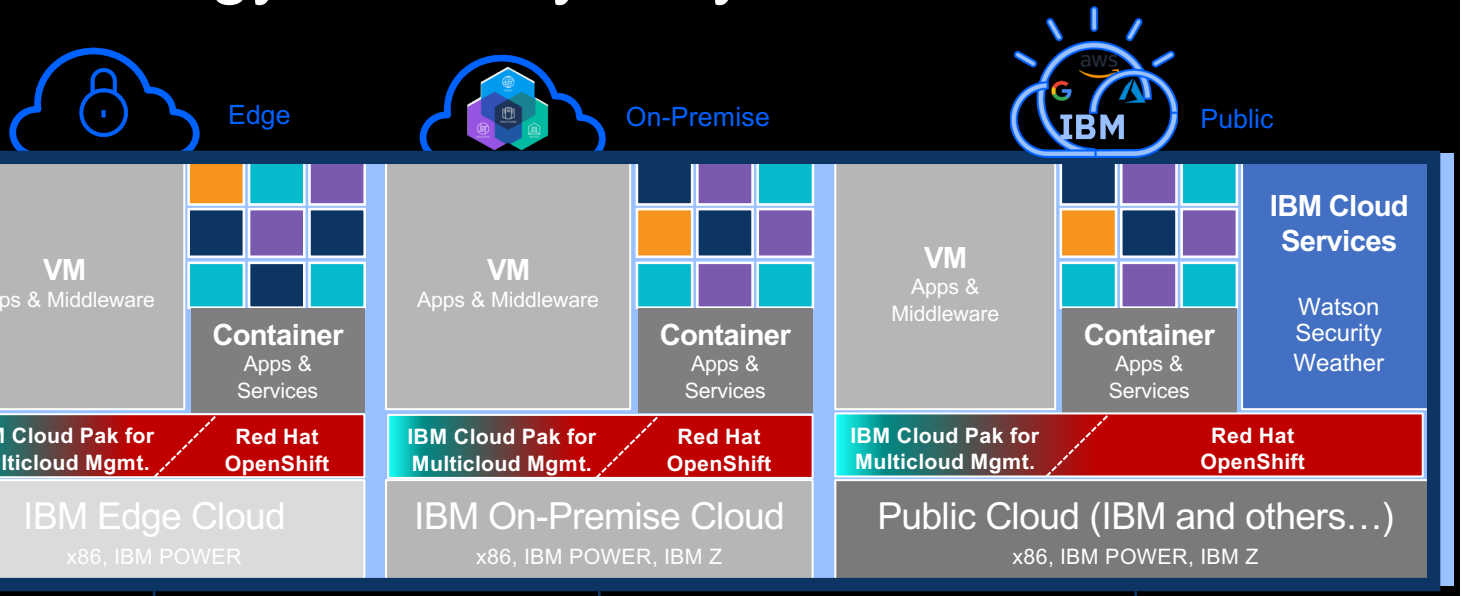
- **Email**: ibmsls@us.ibm.com
- **Web**: ibm.com/it-infrastructure/services/lab-services/power/

IBM Cloud Strategy for today's Hybrid Multicloud World

Develop Once.

Deploy Anywhere.

Operate Everywhere.



Enterprise Grade Infrastructure – *Runs all your apps*

Built from Open Source – *No technology lock-in*

Reliable, Extensible, Scalable – *Grows with you*

Multicloud enabled – *Goes anywhere you need*

IBM Multicloud Manager

Single dashboard to manage all of your clusters—in your data center, in a public cloud or at the edge

aws

Azure

…etc.

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