Cloud Technologies – path to Hybrid Multi-Cloud world

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Cloud accelerates digital transformation

- Innovate with new technology and SaaS from more sources
- Access new types of data, and more ways to analyze it
- Run workloads on the right model and improve ROI

Source: IDC Cloud Forecast
Hybrid and multicloud are the new normal

- **USD 438 billion** in 2020
  - 2018–2020 CAGR 15%
- **USD 609 billion** in 2020
  - 2018–2020 CAGR 18%
- **USD 640 billion** in 2020
  - 2018–2020 CAGR -9%

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

Sources: IDC Cloud Forecast; BCG & McKinsey
The number of hybrid use cases continues to grow...
Two approaches to addressing hybrid cloud...

<table>
<thead>
<tr>
<th>Hybrid Monocloud</th>
<th>Hybrid Multicloud</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Like for like</td>
<td>• Consistent stack across clouds</td>
</tr>
<tr>
<td>• Same software</td>
<td>• Choice of cloud vendors</td>
</tr>
<tr>
<td>• Same hardware</td>
<td>• Open standards-based</td>
</tr>
<tr>
<td>• Single-vendor portability</td>
<td>• Multi-vendor portability</td>
</tr>
<tr>
<td>• Single-vendor management</td>
<td>• Multicloud management</td>
</tr>
</tbody>
</table>

![Logo of cloud providers]
The next phase...

Modernize once.
Innovate anywhere.

Hybrid multicloud

• Open standards liberate apps, workloads, developers
• Open source ecosystems speed innovation
• Secure, open access to data + AI for new insights
Linux is the foundation for open. Red Hat is the leader.

- 54% of public cloud apps run on Linux
- #1 most used platform for development today
- 79% of container hosts are Linux
- 71% paid market share is Red Hat Enterprise Linux
- #2 contributor to Kubernetes open source
## Five principles define our approach to cloud

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Multicloud</th>
<th>Open</th>
<th>Secure</th>
<th>Management</th>
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<tbody>
<tr>
<td>Enable enterprises to work across public, private, and traditional environments.</td>
<td>Manage other vendors’ clouds, acknowledging the reality that client environments are heterogeneous.</td>
<td>Build capabilities that are open by design, enabling client flexibility and reducing vendor lock-in.</td>
<td>Provide reliability and continuous security for the client’s environment.</td>
<td>Offer consistent service level support, logging, management and delivery across the cloud environment.</td>
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</table>
Why betting heavily on containers while the majority of our clients are still running traditional VMs and LPARs?

- Containers are the future as a key component to Build-Ship-Run distributed applications
- Containers bring 2 – 3 times more resource efficiency and speed than VMware
- Containers are based on Linux Operating System and Kernel
- Containers enable the modern Agile business and are a key driver for Digital Transformation
Benefits from adoption of Enterprise scale Hybrid MultiCloud

Illustration of how IBM’s Open Hybrid Cloud, Multi-cloud and App modernization capabilities deliver value

Simplification (agility and cost)
Enterprise Innovation - Agility with compliance (agility)
Developer productivity (agility)
Better cost control (cost)
Higher density (cost)
Service cost savings (cost)

Value Today

2 x faster
Development Productivity

More than 50% reduction
Reducing Overall Cost

More than 50% improvement
Operational Efficiency

Faster revenue
Fast go to Market

Governance and Compliance

Business Impact Avoidance

Sources: IBM experiences with client engagements or TCO analyses

IBM Cloud / Sept 2019/ © 2019 IBM Corporation
IBM Hybrid Multicloud Platform – software anywhere

**Complete yet simple**
and easy to consume

**modular**

**Trusted**
IBM certified stack

**Run anywhere**
on public or private on prem

<table>
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<tr>
<th>Application</th>
<th>Data</th>
<th>Integration</th>
<th>Management</th>
<th>Automation</th>
<th>Security</th>
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</thead>
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<tr>
<td>Linux</td>
<td>Containers</td>
<td>Common Services</td>
<td>Multi-cluster Management</td>
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</tbody>
</table>

**IBM**
Hybrid multicloud platform

- Capabilities
- Foundation
- Infrastructure

**Modernize once,**
avoid recoding expense.

**Innovate anywhere,**
with anyone’s technology.

**Move freely,**
optimize for cost savings.
Cloud Paks – Pre-integrated for cloud use cases

Today, IBM offers clients the first five Cloud Paks...

Cloud Pak for Applications
- Developer & DevOps Tools
- Modernization Toolkit
- Frameworks and Runtimes
- Container platform and operational services

Cloud Pak for Data
- Organize
- Analyze
- Collect
- Infuse
- Container platform and operational services

Cloud Pak for Integration
- API Lifecycle
- Messaging and Events
- App and Data Integration
- Container platform and operational services

Cloud Pak for Automation
- Content
- Operational Intelligence
- Workflow and Decisions
- Container platform and operational services

Cloud Pak for Multicloud Management
- Multicluster
- App and infrastructure
- Security and Compliance Management
- Container platform and operational services

Runs on:
- IBM Cloud
- AWS
- Azure
- Google
- Edge
- On-Premise
- Systems
**Cloud Paks – Pre-integrated for cloud use cases**

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<th>IBM Cloud Pak for Automation</th>
<th>IBM Cloud Pak for Multicloud Management</th>
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<td>IBM Application Navigator</td>
<td>IBM Data Virtualization</td>
<td>IBM API Connect</td>
<td>IBM Automation Content Analyzer</td>
<td>IBM Cloud App Management</td>
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<td>IBM Cloud Transformation Advisor</td>
<td>IBM Cognos Dashboard</td>
<td>IBM App Connect Enterprise</td>
<td>IBM Business Automation Insights</td>
<td>IBM Cloud Automation Manager</td>
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<td>IBM WebSphere Liberty</td>
<td>IBM Db2 Warehouse</td>
<td>IBM Aspera</td>
<td>IBM Business Automation Navigator</td>
<td>IBM Multicloud Manager</td>
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<td>IBM WebSphere App Server</td>
<td>IBM Streams</td>
<td>IBM Event Streams</td>
<td>IBM FileNet Content Manager</td>
<td>IBM Systems</td>
</tr>
<tr>
<td>Node.js</td>
<td>IBM Unified Governance</td>
<td>IBM Integration Navigator</td>
<td>IBM Operational Decision Manager</td>
<td>IBM Operational Decision Manager</td>
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<td>Open Liberty</td>
<td>IBM Watson Machine Learning</td>
<td>IBM DataPower Advanced</td>
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<td>Spring</td>
<td>IBM Watson Studio</td>
<td>IBM MQ for Cloud Integration</td>
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<td>Swift</td>
<td>Python</td>
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<tr>
<td>Kabanero (Microclimate)</td>
<td>RStudio</td>
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<td></td>
<td>Spark</td>
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Operational services

Container platform

IBM Cloud

aws

Azure

Google

Edge

On-Premise

Systems
IBM Cloud Pak Systems and IBM Cloud

Cloud Pak for Applications

Cloud Pak for Data

Cloud Pak for Integration

Cloud Pak for Automation

Cloud Pak for Multicloud Management

**Pre-packaged with hardware into two systems to deploy in less than one day**

- Enables deployment of VM and container-based workloads with simplified, scalable, and consistent management
- Delivers a flexible “pay as you go” capacity model; dynamically scales computing, storage, and networking
- Endlessly extensible to address evolving business needs

**Integrated with IBM’s public cloud, leveraging RedHat OpenShift on IBM Cloud**

- Enterprise-proven managed Kubernetes service running 14k+ production clusters
- Most secure environment for containerized workloads with built-in container level security, isolation, bare metal support, and broad industry compliance (PCI, HIPPA, etc.)
- Built in load balancing and multi-zone availability for simplified management and resiliency
- Cloud Paks are certified and optimized for IBM’s public cloud for accelerating migration of your workloads to the cloud
IBM Cloud Paks - Deployment & Implementation Services

Education and Operational Readiness

- Digital Learning Subscriptions
- Production Readiness Services

MVP Build-up

- Build, Deploy and Run applications
- Collect, organize, and analyze data. Infuse AI.
- Integrate apps, data, cloud services and APIs
- Transform business processes, decisions and content
- Multicloud visibility, governance, and automation

Solution Discovery Workshop

- Application Modernization Workshop
- Discovery Workshop or Design Engagement
- Integration Modernization Workshop
- DBA MVP Discovery Workshop
- Solution Discovery Workshop

Cloud Pak Deployment Services

- Cloud Pak for Application Deployment
- Cloud Pak for Data Deployment
- Cloud Pak for Integration Deployment
- Cloud Pak for Automation Deployment
- Cloud Pak for Multicloud Management Deployment

Container Platform Foundation Services

- Install and configure recommended common operational services
- Integrate built-in dashboards with container software
- Validate dashboards

Install / configure container platform
An Open Hybrid MultiCloud for the Cognitive Enterprise

Delivering the cloud fabric to create once and run anywhere!

Inside out approach for delivering new client insights through data.

Open Hybrid, delivering our capabilities anywhere!

Chapter 2, modernizing the mission critical applications!

Outside in approach for delivering new experience to the clients.

Embedding AI in all (business) processes of an enterprise!
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Thank you

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