Download the current version of the IBM Integration Modernization Field Guide

https://ibm.biz/ibm-modern-integration-field-guide
Why modernize?

Data and application integration is an indispensable element of digital transformation, but 84% of digital transformation projects fail due to siloed data and unreliable integration approaches. Customer journeys to cloud and AI demand new and innovative approaches to integration.

DON’T LET INTEGRATION BECOME AN OBSTACLE TO SUCCESS

**Increase efficiency.** Take advantage of templates, pre-built connectors, and automation to reduce cost and increase speed.

**Provide flexibility.** Use a range of integration patterns that include APIs, message queues, and emerging capabilities such as event-driven architecture and high-speed data transfer built on open standards.

**Enable elasticity & growth.** Embed cloud-native characteristics into your integration landscape to accommodate the pace and volume demands from rapidly changing digital transformation use cases.

**Optimize your investment.** Integrate multiple clouds with an architecture built on an ideal mix of cloud services from different cloud vendors and technologies and across many cloud deployment models (public, private, and SaaS).

What’s inside?

This field guide provides a high-level overview of IBM’s integration modernization approach.

**LEARN IT**
A summary of the concepts.

**GET STARTED**
Tips to start the journey to modernize your integration.
Future-proof development

Centralized traditional architectures can’t keep up with the speed and volume of integrations required for digital transformation. Solve this problem by using an agile integration strategy paired with a hybrid platform.

With a single platform for all integration patterns and capabilities, you can integrate within hybrid multicloud environments, drive speed and application development efficiency while lowering costs, and balance traditional and modern integration requirements.

INTEGRATION IS KEY

Develop an integration modernization strategy. Keep up with today’s digital world by using a decentralized, container-based, and microservices-aligned approach.

Adopt a unified integration platform. Lower the cost for each integration with open technologies and hybrid multicloud architectures.

Protect your investment. To successfully implement your integration strategy, holistically rethink your people, processes, technology, and architecture to keep up with change. Adopt modern development practices like devOps and CI/CD to boost agility.

Learn more

Check out the IBM Garage.
https://www.ibm.com/garage
Modernize your integration landscape

Everything around you is changing. Digital transformation and application modernization demand agility, scalability, and resilience. For your enterprise to meet those demands, you need to shift to a container-based, decentralized, and microservices-aligned approach.

PROACTIVELY RESPOND TO CHANGE

Converge on a common integration platform. Improve availability, resiliency, and maintainability by moving the current enterprise integration capabilities onto a managed container platform and streamline the provisioning of integration services.

Adopt an agile integration architecture. Review integration architecture and strategy against the need for applications to connect to systems inside and outside of the enterprise integration landscape. Promote agility, simplicity, and efficiency.

Focus on the use case. Accelerate innovation by centering your view of integration on your business use case. Reexamine the services consumption model by both digital channel and enterprise applications.

Enrich integration logic. With cognitive AI capabilities, dynamically augment your integration flow logic and composition using event-driven rules and decision policies.

Learn more

Check out IBM Cloud Architecture Center. https://www.ibm.com/cloud/garage/architectures
Connect to data and services anywhere

Expose as APIs, microservices and events

Build new integrations
Leverage existing integrations

Applications  Data stores  Messaging  Event streams  Data streams

Multicloud services  Management  Security  AI

Deploy to any cloud
Develop a modernization strategy

There are a number of focus areas that you need to consider as you embark on your integration modernization journey.

**PLAN SMART & GET STARTED**

**Understand the big picture.** Determine the right amount of modernization needed in each focus area depending on where you are and where your core business needs to be.

**Assess as-is integration landscape.** Identify current integration capabilities and predict future growth using a maturity model.

**Add native characteristics to your enterprise integration.** Start building a hybrid multicloud integration platform to host all your enterprise integration patterns.

**Create an integration roadmap.** Develop criteria to determine the right path to transition from traditional integration to modern integration in each focus area and map the journey to a timeline.

Learn more

Check out the Application modernization architecture.  
https://www.ibm.com/cloud/garage/architectures/application-modernization
There are several characteristics for modernized integration. For each characteristic, determine what level is best for your enterprise.

<table>
<thead>
<tr>
<th>Integration characteristics</th>
<th>Traditional</th>
<th>Modern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DevOps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Ops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runtime</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Augmentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Evolve to agile integration

Agile integration is an approach that breaks a centralized monolithic integration component, such as an enterprise service bus (ESB), into smaller fine-grained independent components. Those smaller components can be dropped into the architecture seamlessly and removed or updated without disrupting other components.

IT’S ALL ABOUT PEOPLE, PROCESS, & TECHNOLOGY

Rethink ownership. As the number of digital channels grows and the variety in their back-end service consumption increases, the ownership of the integration layer becomes less centralized and shifts to the application layer.

Access fine-grained data via APIs. Tailor the data you expose to external third-party developers, to business partners, and to internal departments within your company. Developers can readily use standard APIs to build their own business objects.

Scale with lightweight integration runtimes. With the advent of virtual machines, containers, and container orchestration, you can break the centralized ESB pattern into smaller, more easily managed independent pieces.

Learn more
Check out the Accelerating Modernization with Agile Integration redbook. http://www.redbooks.ibm.com/abstracts/sg248452.html
Agile teams
Squads
Guilds

Automation
CI/CD

Decentralized
Fine-grained
Container-based
Journey entry points

Every modernization journey starts in a different place, but the need for an integration platform is the same. It enables you to benefit from cloud characteristics like scalability, performance, and agility.

START FROM WHERE YOU ARE

Accelerate digital transformation. Digital channels require new, innovative access to enterprise data and services that drive the agility of your integration platform.

Respond to core modernization. Reexamine your existing enterprise integration endpoints because either your systems of record (SoRs) have lift-shifted to cloud or moved to a SaaS model, your enterprise applications have refactored from monolithic to native, or your partner ecosystem has modernized their own interfaces.

Enable autonomous teams. Business-led technical teams will run into new integration challenges they will try to solve on their own. Ensure they are aware of modern and highly productive integration tooling to ensure integrations are implemented effectively using proven and matured patterns.

Embrace the middleware evolution. Integration middleware product roadmaps now include virtualization, containerization, as-a-service deployment and multicloud support.

Learn more

No matter where you are, we can get you where you need to be.
Modern integration architecture

In enterprise integration modernization, new integration endpoints and patterns are constantly being introduced. With an agile integration architecture, you can react to this continuously iterating environment, safely adjusting and introducing integrations in isolation.

DON’T MODERNIZE FOR THE SAKE OF MODERNIZING

Introduce fine-grained integration flows. Change, rebuild, and deploy integration flows independently to safely implement changes, scale, ensure resilience, and maximize speed to production.

Decentralize integration ownership. Distribute ownership of the creation and maintenance of integrations to remove the need for a centralized integration team, infrastructure, and related bottlenecks.

Adopt cloud infrastructure. Run your light weight integration runtimes in a container-based environment that is well suited to cloud-native deployment techniques.

Learn more

Combine multiple integration patterns across a hybrid multicloud infrastructure in response to the needs of your users.
What are IBM Cloud Paks?

Beyond containers and Kubernetes, you need to orchestrate your production topology and provide management, security and governance for your applications. IBM Cloud Paks are enterprise-ready, containerized software solutions that run on Red Hat® OpenShift® on IBM Cloud™ and Red Hat Enterprise Linux. Built on a common integration layer, IBM Cloud Paks include containerized IBM middleware and common software services for development and management.

GET STARTED

Learn more

Check out IBM Cloud Paks.
https://www.ibm.com/cloud/paks/
IBM Cloud Pak™ for Applications. Quickly build cloud-native apps by leveraging built-in developer tools and processes, including support for microservices functions and serverless computing.

IBM Cloud Pak™ for Data. Simplify the collection, organization, and analysis of data. Turn data into insights through an integrated catalog of IBM, open source, and third-party microservices add-ons.

IBM Cloud Pak™ for Integration. Embrace an agile, AI-accelerated approach to integration. Enable extended teams to create integrations, leverage a complete set of styles and capabilities, and embed AI and automation across the integration lifecycle. Speed integration development, reduce costs, and increase overall operational efficiency while maintaining enhanced security, governance, and availability.

IBM Cloud Pak™ for Automation. Deploy on your choice of clouds, with low-code tools for business users and real-time performance visibility for business managers. Migrate your automation runtimes without application changes or data migration. Automate at scale without vendor lock-in.

IBM Cloud Pak™ for Multicloud Management. Gain consistent visibility, automation, and governance across a wide range of hybrid, multicloud management capabilities including integration with existing tools and processes.

A faster, more reliable way to move to cloud.
IBM Cloud Pak for Integration

Simplify the management of your integration architecture, increase the speed of integration, and reduce cost with a complete set of integration styles and capabilities. Extend AI-powered automation across the integration lifecycle while maintaining enhanced security, governance, and availability.

FAST, EASY, AND SECURE MODERN INTEGRATION PATTERNS

API management. Create, secure, manage, share, and monetize APIs across clouds while you maintain continuous availability.

Application and data integration. Integrate your business data and applications quickly and easily across any cloud system.

Enterprise messaging. Simplify, accelerate, and facilitate the reliable exchange of data with a trusted, flexible, and security-rich messaging solution.

Event streaming. Use Apache Kafka to deliver messages more easily and reliably and to react to events in real time.

High-speed data transfer. Reliably send, share, stream, and sync large files and data sets at maximum speed.

Platform-level security, automation, and monitoring. Quickly set up and manage gateways, control access on a per resource basis, deploy your integration flows, and monitor all of your traffic.

Learn more

Check out the IBM Cloud Pak for Integrations. [https://www.ibm.com/cloud/cloud-pak-for-integration](https://www.ibm.com/cloud/cloud-pak-for-integration)
IBM Cloud Pak for Integration - Proven integration patterns simplify your architecture and reduce cost.
API management

Bridge the gap between cloud and on-premises applications quickly and easily by abstracting your back-end implementation as APIs. One of the best ways to do this is by exposing services as APIs for external consumption and let the consuming applications compose the integration logic.

INNOVATE WITH A USER-CENTRIC PERSPECTIVE

**Expand.** Provide a standard API interface. Include global API discovery to access key business functions as fine-grained services. Encourage data reuse and mashups driven by innovative transformation use cases.

**Integrate.** Create a significant impact on your business goals by exposing core services through managed APIs. Enable projects to integrate with one another and discover the benefits of synergy across the enterprise. Use AI models pre-trained on API calls and customer relationship management (CRM), sales, and marketing data to highlight business value analytics.

**Scale.** Be prepared to scale dynamically based on the demands of your expanding ecosystem and other usage metrics. Use AIOps practices to detect, identify, and resolve production performance issues. Feed the results into the Integration Assembly process to train integration asset creation based on new best practices.

Learn more

Check out the API management architecture. [https://www.ibm.com/cloud/garage/architectures/apiArchitecture](https://www.ibm.com/cloud/garage/architectures/apiArchitecture)
Simplify the management of your integration architecture and reduce cost with the IBM Cloud Pak for Integration.
Application & data integration

Integrate all your business data and applications across any cloud quickly and easily using open standards. Use pre-built smart connectors and a common, shareable asset repository to alleviate the concerns about mismatched sources, formats, or standards and increase the speed of integration delivery. Low-code/no-code integration tools use natural language processing (NLP) and AI to offer custom mapping suggestions when building integration flows.

SIMPLIFY AND CONSOLIDATE YOUR INTEGRATION LANDSCAPE

Integrate applications. Connect applications and data sources on-premises or across multiple clouds to coordinate the exchange of business information as a coarse-grained service so core data and transactions maintain their integrity. Use a robotic process automation (RPA) connector to scrape key details from legacy applications to provide new metadata and enable effective connectivity.

Integrate data. In near real time, synchronize data across multiple endpoints to achieve a cohesive view of data, gathered from legacy back ends to SaaS applications, to DBaaS repositories, to analytics services.

Incorporate agile integration. Unify cross-enterprise capabilities. Enforce the use of core enterprise services and business processes. Include cognitive augmentation in your integration logic. Set up agile organizational models and governance practices.

Learn more

Check out the IBM Cloud Pak for Integration.
https://www.ibm.com/cloud/cloud-pak-for-integration
Integrate all of your business data and applications more quickly and easily across any cloud.
Enterprise messaging

Simplify, accelerate, and facilitate the reliable exchange of data with a flexible and security-rich messaging solution. Extend traditional messaging capabilities in modern applications to communicate with new technologies from AI, IoT devices, and other digital channels.

RECEIVE THE INFORMATION YOU NEED WHEN YOU NEED IT

Ensure secure and reliable messaging. Preserve message integrity throughout the network, protect data, and ensure regulatory compliance with security-rich functions. Provide reliable delivery without message loss, duplication, or complex recovery.

Unify your enterprise. More easily integrate heterogeneous application platforms using industry-standard JMS messaging protocols, scalable publish-subscribe, and a choice of APIs.

Expect high performance and scalable message transfer. Your apps can rely on a highly available solution with fully automated failover, dynamically distributed messaging workloads, high-throughput, suggestions for queues to reuse, and a low-latency solution.

Simplify management and control. Use a dashboard to gain insights with visibility to message and file tracking. Audit data movement and transaction completion.

Learn more

Check out the Hybrid messaging architecture.
https://www.ibm.com/cloud/garage/architectures/hybrid-messaging
Enterprise capabilities are never homogeneous — unify them!
Event streaming

Take advantage of event streams to build adaptive solutions with engaging, more personalized user experiences by responding to events before the moment passes. By design, events occur in a continuous stream from a multitude of sources in a low-latency, high-velocity manner.

**REACT IN REAL TIME**

**Decrease system complexity.** Loose coupling allows event producers to emit events without any knowledge about who is going to consume those events. Likewise, event consumers don’t need to be aware of the event emitters.

**Simplify the interface.** One event producer can reach multiple endpoints with a single call.

**React to events as they happen.** Enable the following scenarios: IoT device, streaming analytics, real-time back-end transactions, geo-location tracking, and auditing.

**Facilitate machine learning.** Improve predictive analytics by moving to real-time event streaming from batch processing.

[Learn more](https://www.ibm.com/cloud/garage/architectures/eventDrivenArchitecture)
Applications can react and reason about the future based on what happened in the past.
High-speed file transfer

Enterprises need a reliable, fast, secure data transfer and synchronized system that is hybrid and multicloud. An integration platform makes it possible to securely transfer data across geographies faster than traditional tools, between any kind of storage, whether it’s on-premises, in the cloud, or across diverse cloud vendors.

DATA — WHERE AND WHEN YOU NEED IT

Integrate application data. Coordinate the exchange of business information so that data is available when and where it is needed.

Transform data for analytics. Access, cleanse, and prepare data to create a consistent view of your business within a data warehouse or data lake.

Enrich enterprise data. Augment DBaaS content with data from enterprise back-end systems for a 360-degree view of the user. Allow partner and in-house data sources to sync and complement each other’s updates.

Transfer data. Move huge amounts of data between on-premises and cloud or from cloud to cloud rapidly and predictably with enhanced levels of security. Speed the adoption of cloud platforms when data is very large and needs to be exchanged across long distances.

Learn more

Check out the IBM Cloud Pak for Integration.  
https://www.ibm.com/cloud/cloud-pak-for-integration
High-speed data transfer

Transfer data securely with speed.
Platform-level security, automation, and monitoring

Extend integration assets with security, governance, and performance policies and automations across the entire DevSecOps lifecycle.

SECURE, MONITOR, & AUTOMATE INTEGRATION ASSETS

Suggest policies to apply. Enable solution architects and security engineers to identify governance, performance, and security policies attached to integration patterns.

Update policies for future integration asset creation. Enable solution architects and security engineers to update existing governance, performance, and security policies attached to integration patterns based on real time behavior.

Enforce policies during integration development. Build integrations with pre-defined policies based on prior integration assets that represent best practices.

Validate policy compliance prior to runtime. Use AIOps practices to enforce policy compliance prior to deployment into production.

Detect production issues and act based on related automation. Use AIOps practices to detect production performance issues. Feed information into the integration assembly process to train future integration asset creation based on best practices.

Learn more

Check out the IBM Cloud Pak for Integration.
https://www.ibm.com/cloud/cloud-pak-for-integration
Platform-level security, automation monitoring
Let’s pull it all together: A user-centric integration story

In this example, every integration requires a different pattern. A fictional insurance company has implemented a new program to reward its members for their healthy activities. They measure activities via wearable devices and capture and aggregate metrics to compute rewards. Risks are understood through analysis from health partners, and if a member is at risk an alert is sent to the member to discontinue the program.

GET REWARDED FOR STEPS

Learn more

Check out the IBM Cloud Pak for Integration. 
https://www.ibm.com/cloud/cloud-pak-for-integration
**Event streaming.** The member’s smart device logs and tracks steps. These events are sent to the mobile application and published to an event-stream for back-end processing. The back-end application aggregates the event data and computes the discount percentage on the premium.

**API lifecycle management.** The member’s doctor receives the test results from the patient’s device. The doctor logs into the hospital’s portal to report the test data and upload all imaging records and test metrics into the portal’s repository. The hospital is a network partner and its web app invokes a business API to report the data. The API submits the report to the back-end SOR for further processing and follow-up.

**Enterprise messaging.** The enterprise application uses business rules to detect that the member is having a heart arrhythmia condition and is currently participating in a rigorous high-risk fitness activity. It places an alert event to a hybrid message queue, which triggers a push notification to send an SMS text mobile alert to the member.

**Application and data integration.** The back-end SoR invokes an integration flow to perform an update across all data sources pertaining to the member’s new condition. The integration flow updates the member’s profile in the cloud database so that the mobile application has the latest information. It triggers the high-speed file transfer component to sync new patient information and patient imaging results from the hospital’s portal repository with the back-end SoRs.

**High-speed data transfer.** The high-speed file transfer component accesses the patient’s records from the hospital’s portal repository and moves them across geographies to the enterprise SAN storage. An ETL content import component ingests the new data into the back-end SoR.
IBM Garage: Accelerate your journey

Modernization comes in many flavors, and rewriting your entire estate is not feasible. Big bang modernization efforts are risky, so it is best to break large initiatives into smaller projects with measurable impact. Your goal is to accelerate value, deliver frequently, and reduce risk. IBM Garage experts can help.

REFACTOR WHAT’S NECESSARY, BUT DON’T NECESSARILY REFACTOR

Co-create. Identify a business modernization opportunity. Define and build the MVP with your squad, get feedback, and co-create a solution.

Co-execute. Manage risk by choosing the right approach to modernize your current estate. Accelerate your journey through automation and technology.

Co-operate. Harden for production, standardize operations, and improve DevOps efficiency across your application estate.

Learn more

Check out the IBM Garage.
https://www.ibm.com/garage
IBM Garage is a trusted partner, providing technology and prescriptive guidance to deliver immediate business value.

Modernize your applications quickly and safely using our accelerators and tools.

Engage IBM Garage experts!

Cloud modernization roadmap

Design workshops

Plan MVP

Test, pilot, prove

Measure outcomes

Learn from feedback

Success!!
Notes:

IBM Cloud Pak for Integrations: Get started!!
https://www.ibm.com/cloud/cloud-pak-for-integration/get-started

Check out the IBM Cloud Pak for Integration
https://www.ibm.com/cloud/cloud-pak-for-integration

Evaluate your integration maturity
Modern integration architecture
https://www.ibm.com/cloud/garage/architectures/modern-integration

Learn more about Red Hat OpenShift
https://www.openshift.com/

Learn about Agile integration
https://www.ibm.com/cloud/integration/agile-integration
Visit an IBM Garage
https://www.ibm.com/garage

Take the course: Explore the Garage Method, and get a badge!!!
ibm.biz/explore-method-course