



IBM Application Modernization

IBM Cloud

Application Modernization

Application modernization is **business modernization**

Application modernization is the **transition of existing applications to new approaches on the cloud**, helping you achieve the following business outcomes:

- Speed to market
- Rapid innovation
- Flexibility
- Cost savings

Accelerate digital transformations

Driven by need to build new capabilities and deliver them quickly

Improve developer productivity

Developer self service via adoption of Cloud Native architecture and Containerization

Increase operational efficiency and standardization

DevOps enablement drives a culture of automation and transformation of operations

IBM's application modernization approach

Enterprises' existing estates determine the best journey to modernization

BENEFITS

1

Increased Agility

Technology to:

Gather application inventory
Provide guidance on the
journey to cloud

Enable infrastructure as
code

2

Reduced Risk

Self service
with IBM Garage Methods
to help with modernization

Access to variety of proven
approaches to modernize

3

Turnkey

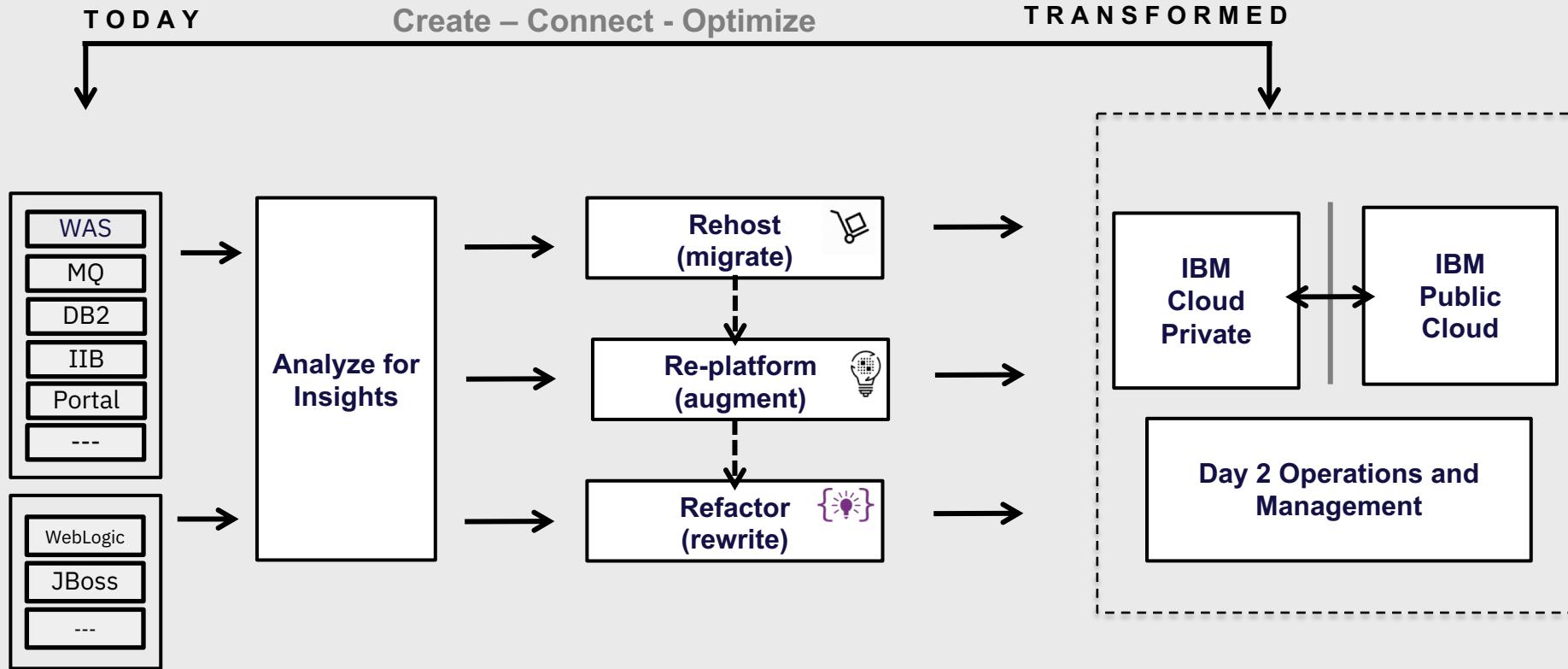
IBM experts
who have an understanding
of your traditional
applications and the
business outcomes you
need to achieve

Innovate rapidly by adding
new capabilities to existing
applications

Modernize at customer's
pace

Option to modernize
applications at scale

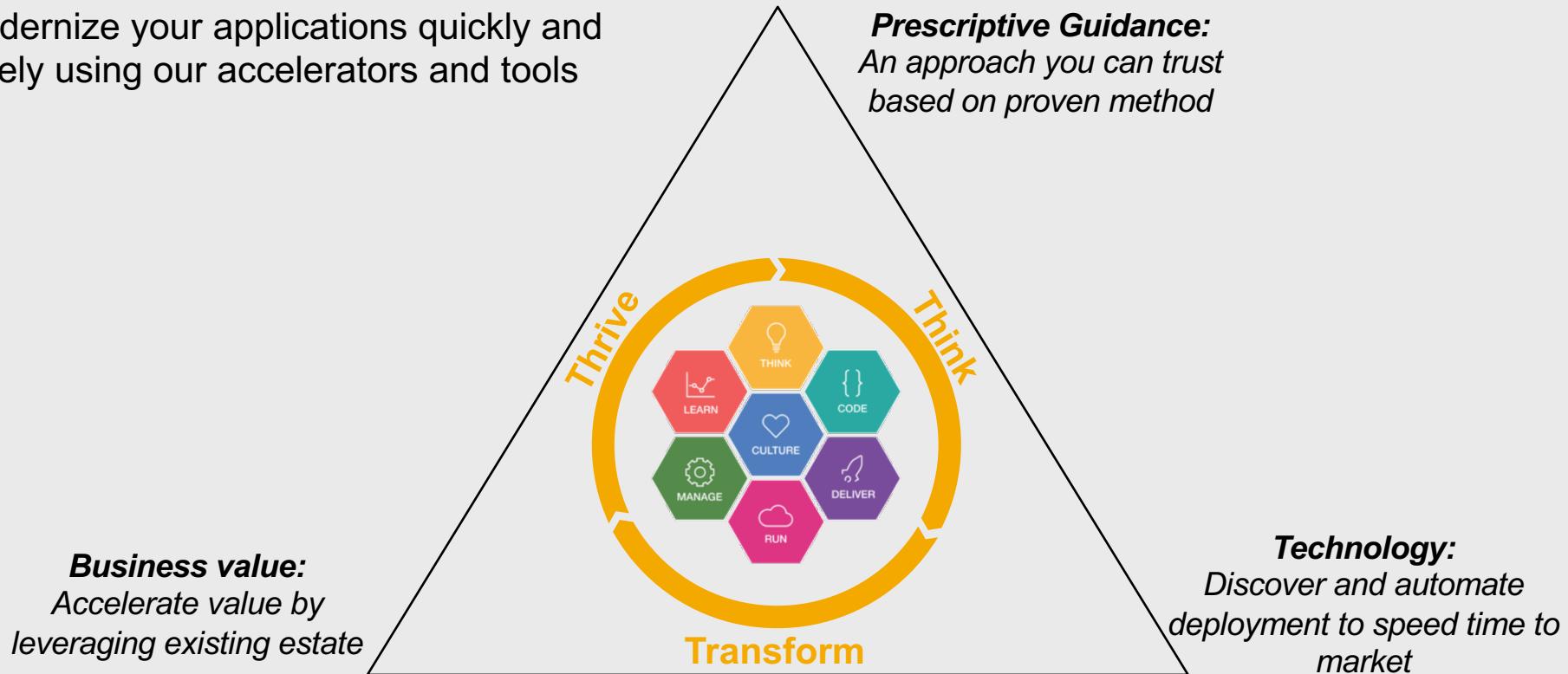
Application Modernization Framework



IBM's AppMod Method

Modernize your applications quickly and safely using our accelerators and tools

Prescriptive Guidance:
An approach you can trust based on proven method



Modernize your application

Whether you're moving workloads in stages or working through a complete transformation, you'll have applications that you'll need to move to the cloud.

Webinar: Migrating your JEE WebSphere app to IBM Cloud Private [Watch now](#)

[← Architecture Center](#)

Application modernization

Overview

Reference architecture

[Get code](#)

Build and deploy a stock trader application on IBM Cloud Private

Migrate traditional WebSphere apps to WebSphere Liberty on IBM Cloud Private by using Kubernetes

Engage IBM Experts

Consult with application modernization experts

IBM Cloud architects provide strategic services for migrating workloads to the cloud.

[Learn more](#)

Application modernization reference architecture

To successfully transform your business competitive, you need to modernize your infrastructure (both internal and external). A careful assessment will determine the amount of work required to migrate your legacy apps. Adoption of technologies, such as microservices, are providing simplicity. Throughout your application modernization, learn about these technologies and experience them first hand.



IBM Cloud Garage

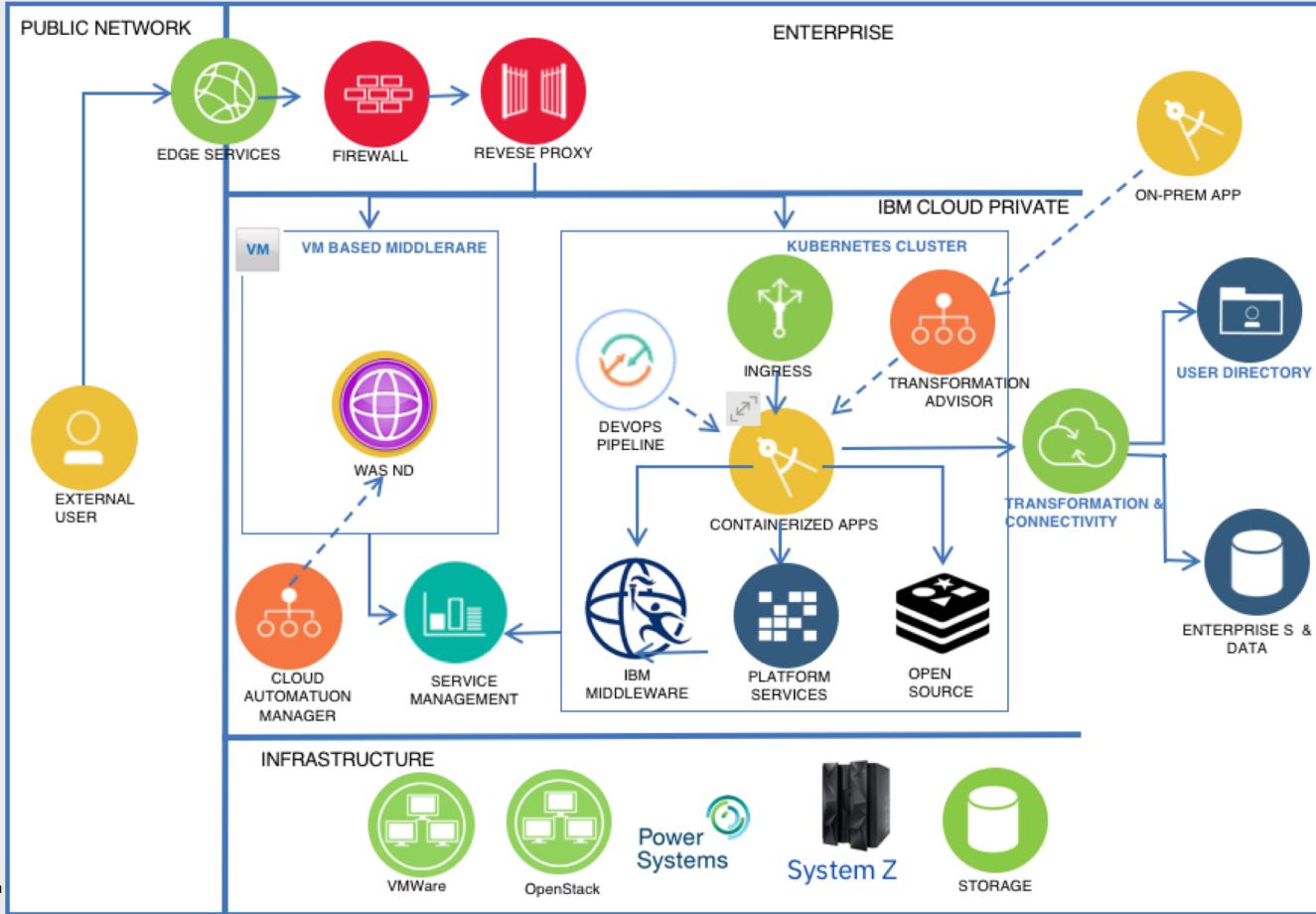


IBM Cloud Garage Method



ibm.com/cloud/garage

Reference architecture for application modernization



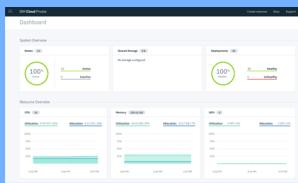
Application modernization technology

Garage Method

Architectures, best practices, and toolchains to jump-start modernization

IBM Cloud Private

A transformative platform for building and running cloud-native applications and modernizing existing enterprise.



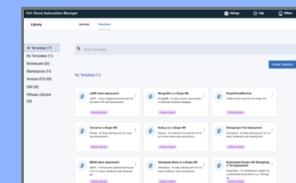
Transformation Advisor

Assess and Deploy traditional apps into IBM Cloud Private



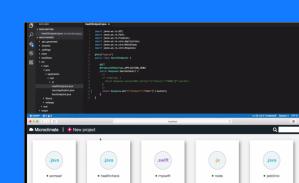
Cloud Automation Manager

Multi-Cloud Provisioning
Pre-Built Automation Content



IBM Microclimate

End to end development environment that lets you rapidly create, edit, and deploy applications.



Cloud Production

Deployment planning

Production environment

Production readiness

Service management

DevSecOps

Backup and recovery

Development modernization and pre-integrated DevOps

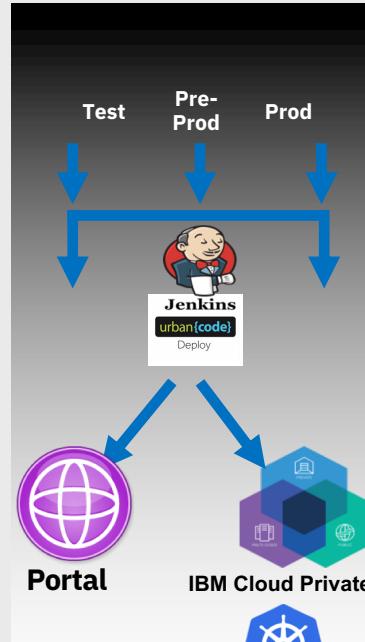
DEVELOP

VERSION
CONTROL

BUILD

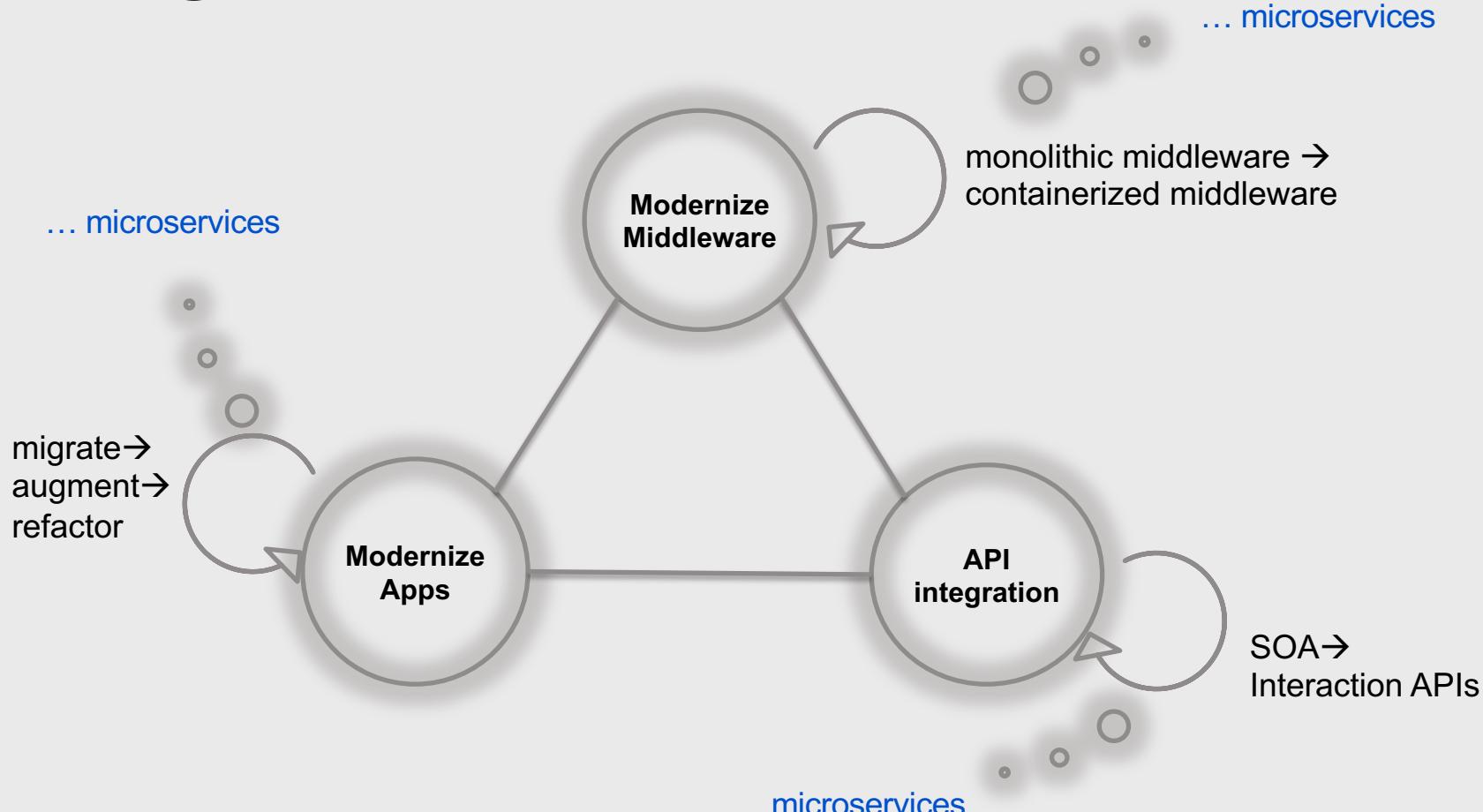
DEPLOY

MANAGE /
MONITOR



- ✓ Autoscaling
- ✓ Intelligent management capabilities
- ✓ Caching
- ✓ Healthcheck service
- ✓ Security

AppMod @3000ft



AppMod @3000ft



**Modernize
Apps**

Why containers for application modernization?



Todd

Operations / Admin

Responsible for infrastructure, security, and management of the environment.



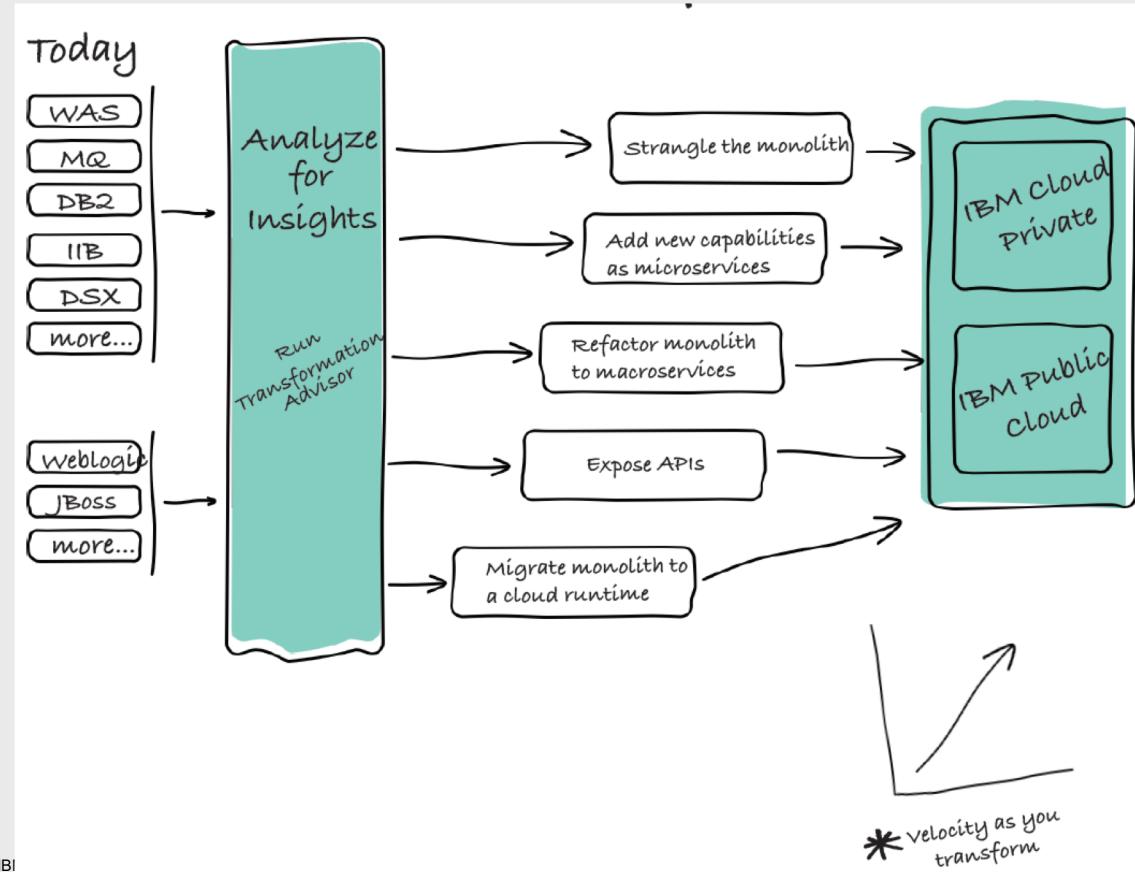
Jane

Enterprise Developer

Responsible for modernizing existing applications and creating new Cloud Native Workloads.

- Simpler, lighter and denser than VMs
- Portable across different environments
- Provisioning takes a few seconds, I can respond quickly to spikes in usage
- Simple updates, zero app upgrade middleware updates
- Self-healing with Kubernetes
- Package my app and all its dependencies
- Deploy to any environment in seconds, enable DevOps
- Decreased time for development, testing, and deployment
- Testing and bug tracking are easier because there is no difference between running locally, on a test server, or in production
- Great option for microservices

Application modernization journey



Containerize the monolith. Reduce costs and simplify operations.

Expose on-prem assets with APIs. APIs enable legacy assets that are difficult to cloud enable.

Refactor into microservices. Break down monoliths into deployable components.

Add new microservices. Innovate incrementally and establish success early.

Strangle the monolith. Incrementally sunset the monolith.

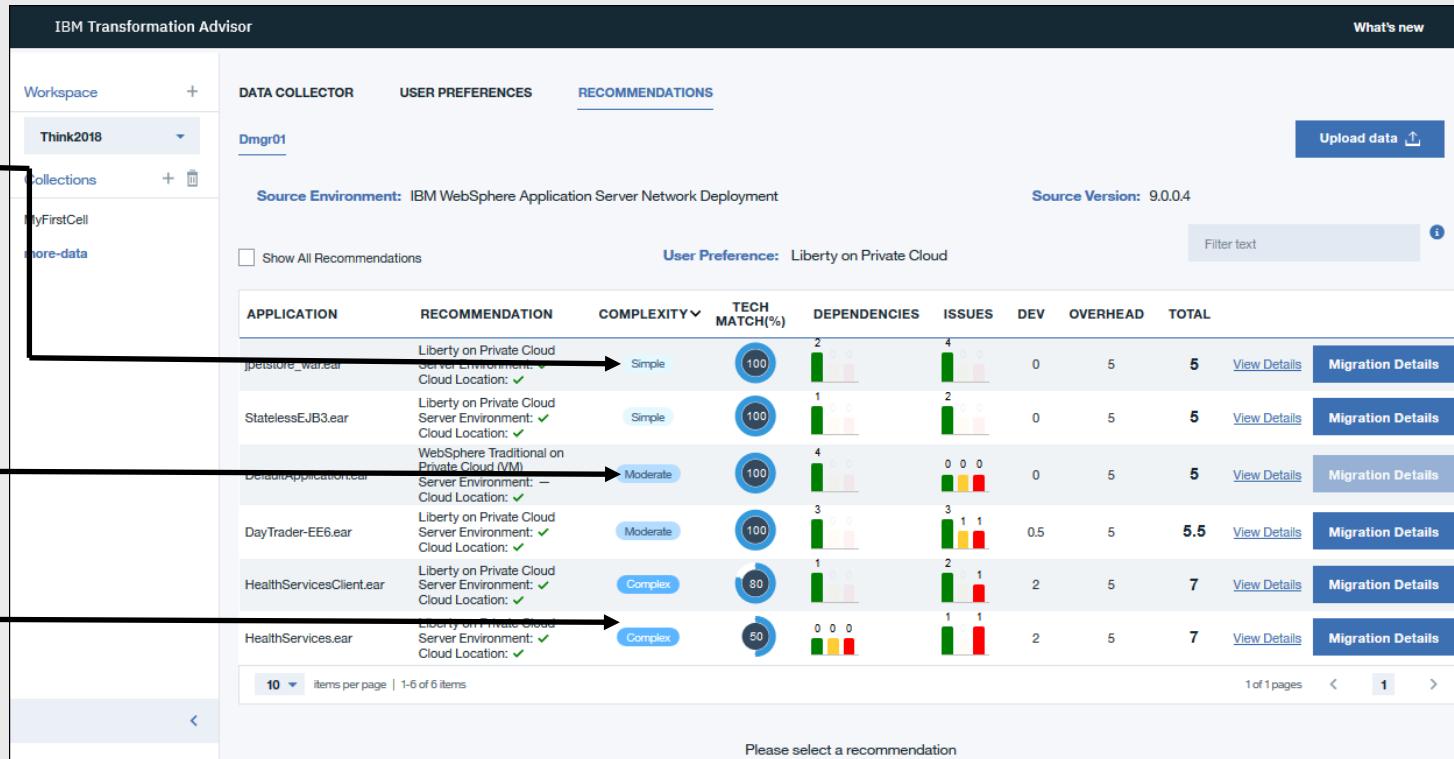
IBM Transformation Advisor

Helps classify existing apps based on their modernization complexity

Simple:
No code changes

Moderate:
Some refactoring
needed

Complex:
May decide to run
in WAS in VMs before
re-engineering



IBM Transformation Advisor

Generates artifacts to help you automate deployment onto IBM Cloud Platform(s)

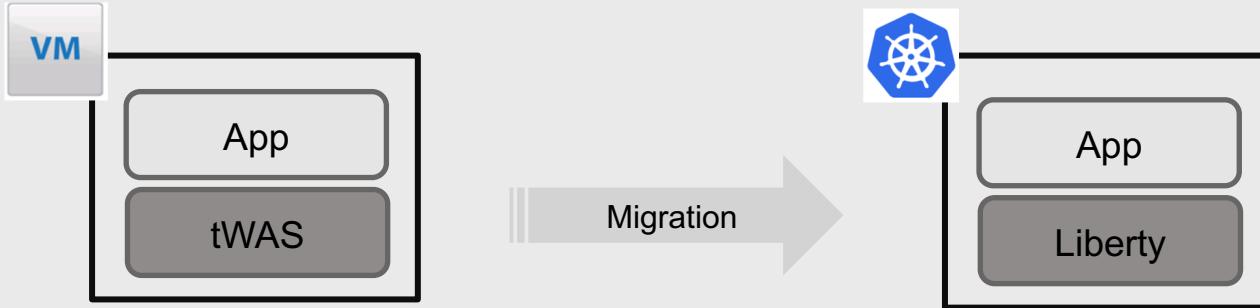
The screenshot shows the IBM Transformation Advisor interface with the following details:

- APPLICATION:** jpetstore_war.ear (IBM WebSphere Application Server Network Deployment)
- MIGRATION BUNDLE:** Your migration bundle is ready.
- Included in the bundle:**
 - Migration Files:** server.xml, Dockerfile, Helm Charts, deployment.yaml
 - Application Dependencies:** APPLICATION Binary (jpetstore.war)
- MIGRATE TO:** IBM WebSphere Liberty on IBM Cloud Private
- Download Bundle** button
- HOW IT WORKS:** View the steps →
 - ① Migrate to IBM WebSphere Liberty (Icon: stack of clouds)
 - ② Containerize WebSphere Liberty (Icon: stack of containers)

Annotations on the left side point to specific sections:

- A horizontal line points to the "Move to Liberty" section under the "MIGRATION BUNDLE".
- A horizontal line points to the "Containerize and deploy" section under the "MIGRATION BUNDLE".
- A bracket groups the "Migration Files" and "Application Dependencies" sections, pointing to the "Containerize and deploy" annotation.

Containerized Monolith



What

- Containerized runtime and middleware
- As little application change as possible
- Keep integrations and data on-prem
- Self-service developer access

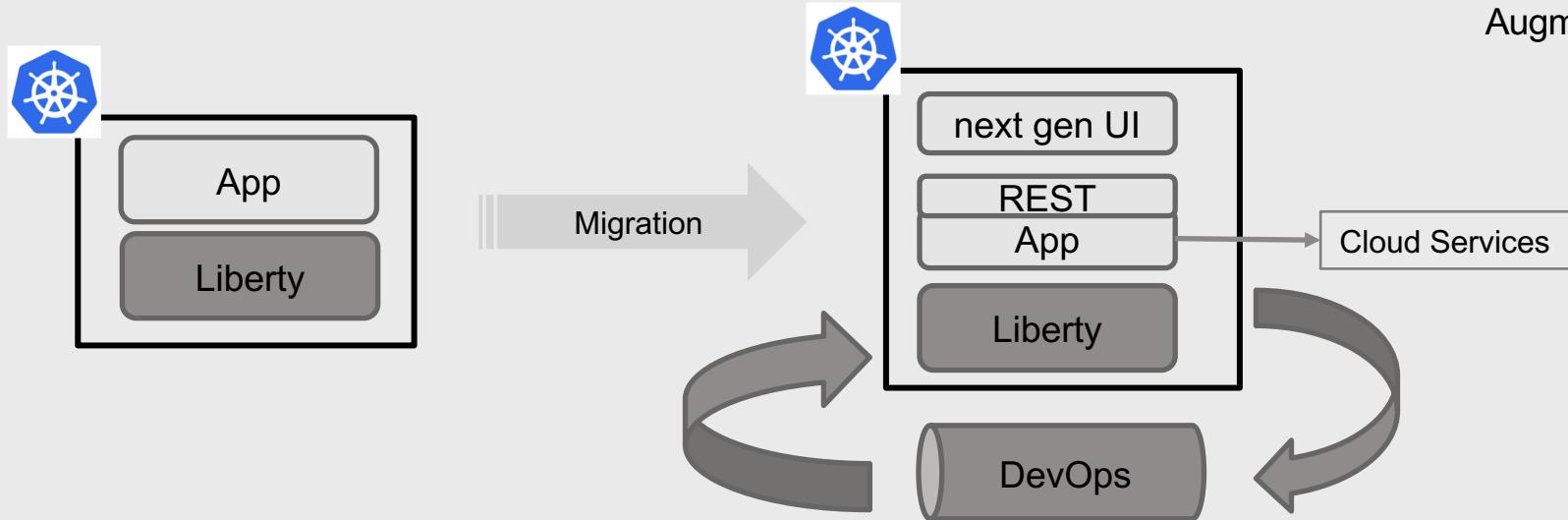
Why

- Runs on cloud
- Small runtime/ Fast startup
- “Zero” future version migration
- Cloud portability
- Lower operational costs (higher runtime density)

Fast Monolith



Augment



What

- Legacy is preserved, new capabilities added
- Modern DevOps
- Modern development tools

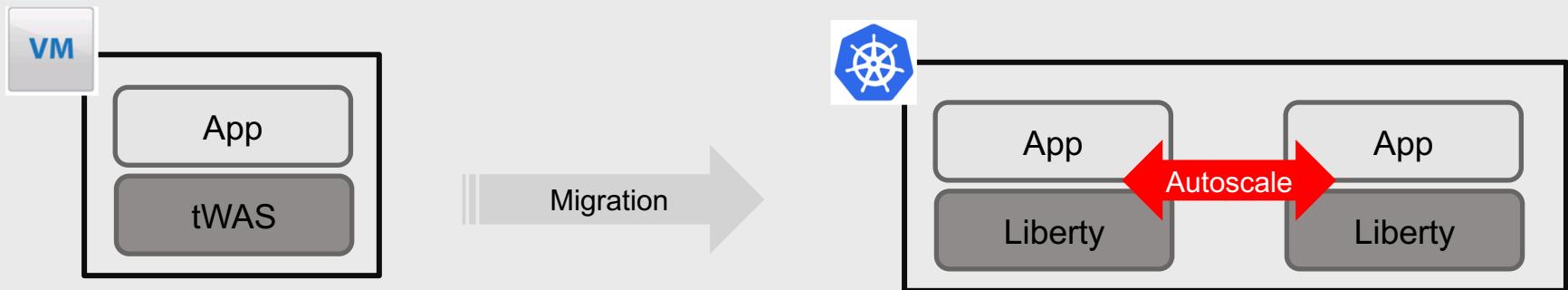
Why

- Accelerate delivery cycle: months → week(s)
Constant innovation
- next gen UI experience
 - Cloud services

Scalable Monolith



Refactor



What

- Augmented Monolith: 12 Factors
- Data/integrations stay on-prem

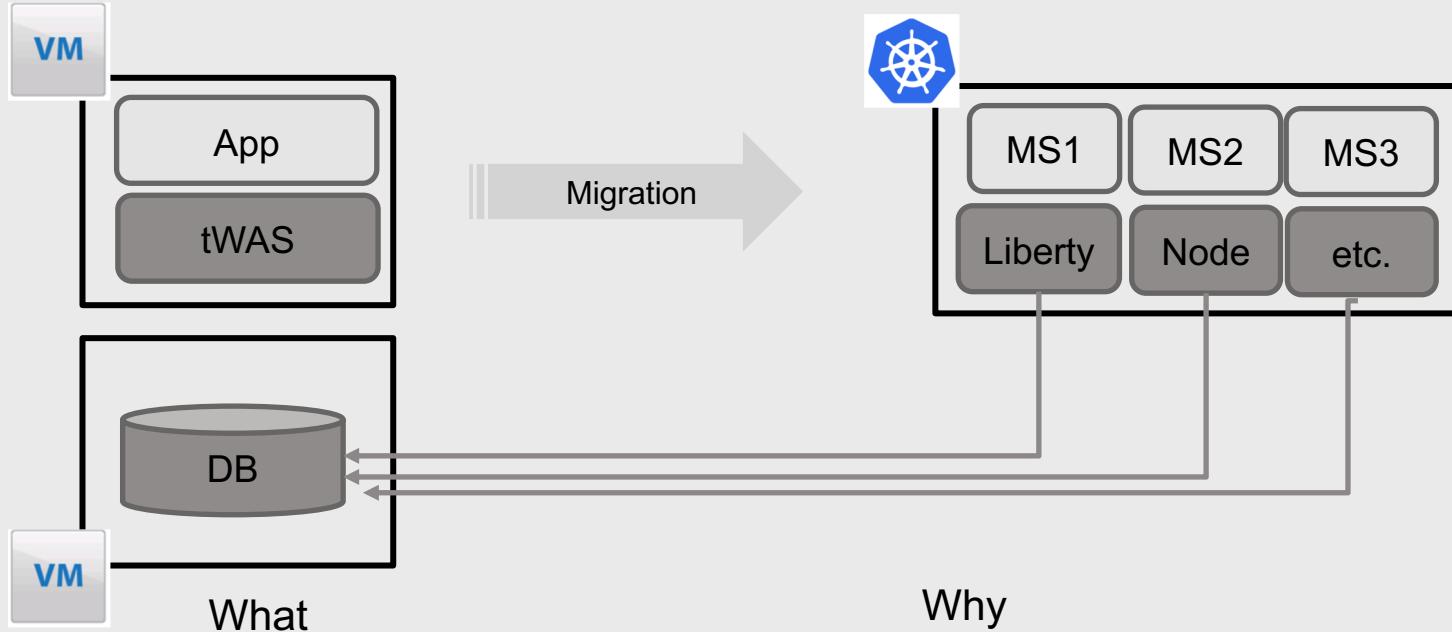
Why

- Horizontally scalable
- Platform provided HA
- Substantial operational efficiencies

Macro-services aka “Microlith”



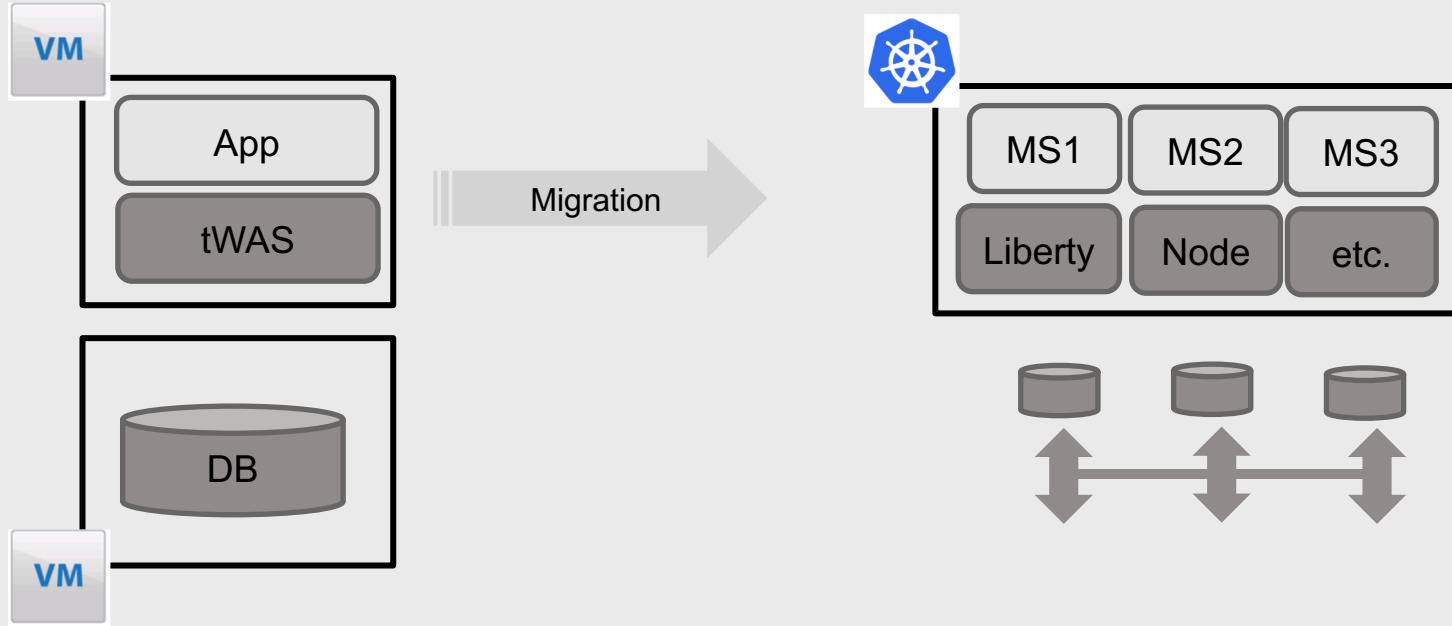
Refactor



- Break down application monolith into independently deployable modules
- Data remains a monolith

- “Half-way house” to microservices

Microservice



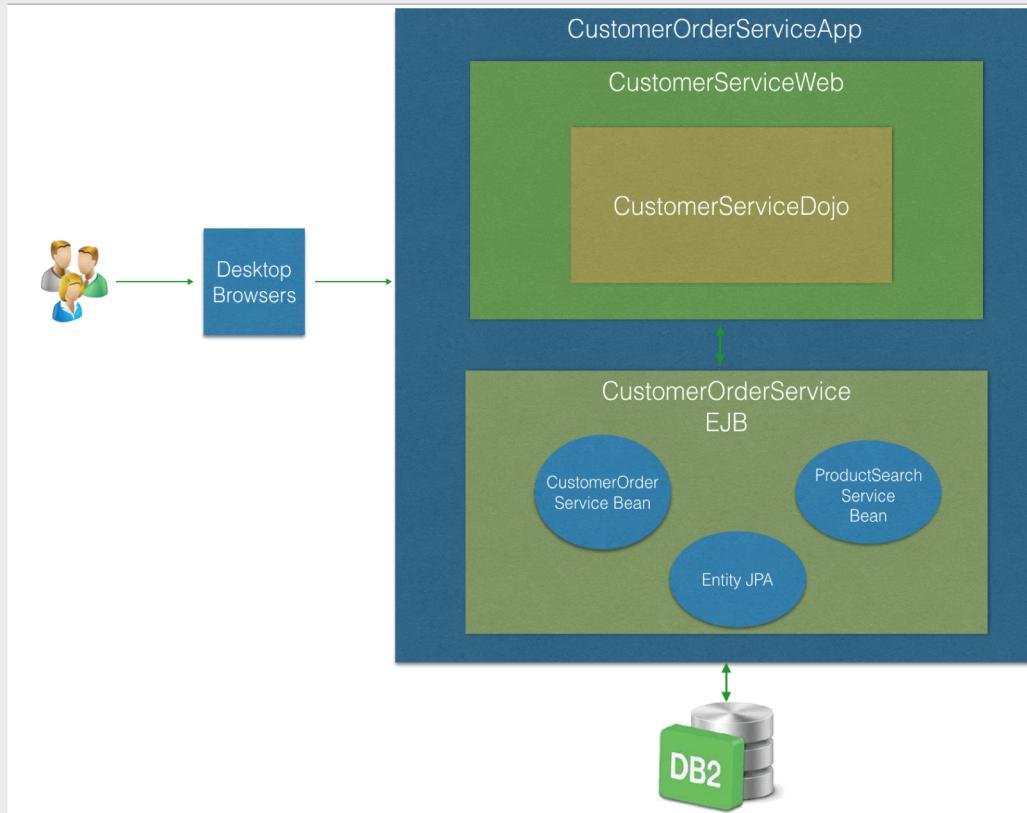
Example: Refactoring a monolith to microservices

Original architecture

- Single relational DB schema
 - Products, Customer, Ordering, etc.
- Single deployment unit (EAR file)

Business problems

- Limited searching capabilities for products.
- Little knowledge of customer for targeted experience
- Ordering system is complex
 - Difficult to add product and customer analytics to site without breaking Order System.



Modernization outcomes

Catalog data imported into Elastic Search

- Clients delighted by new fuzzy search

Customer data modeled and stored in document NoSQL store with analytic and social data

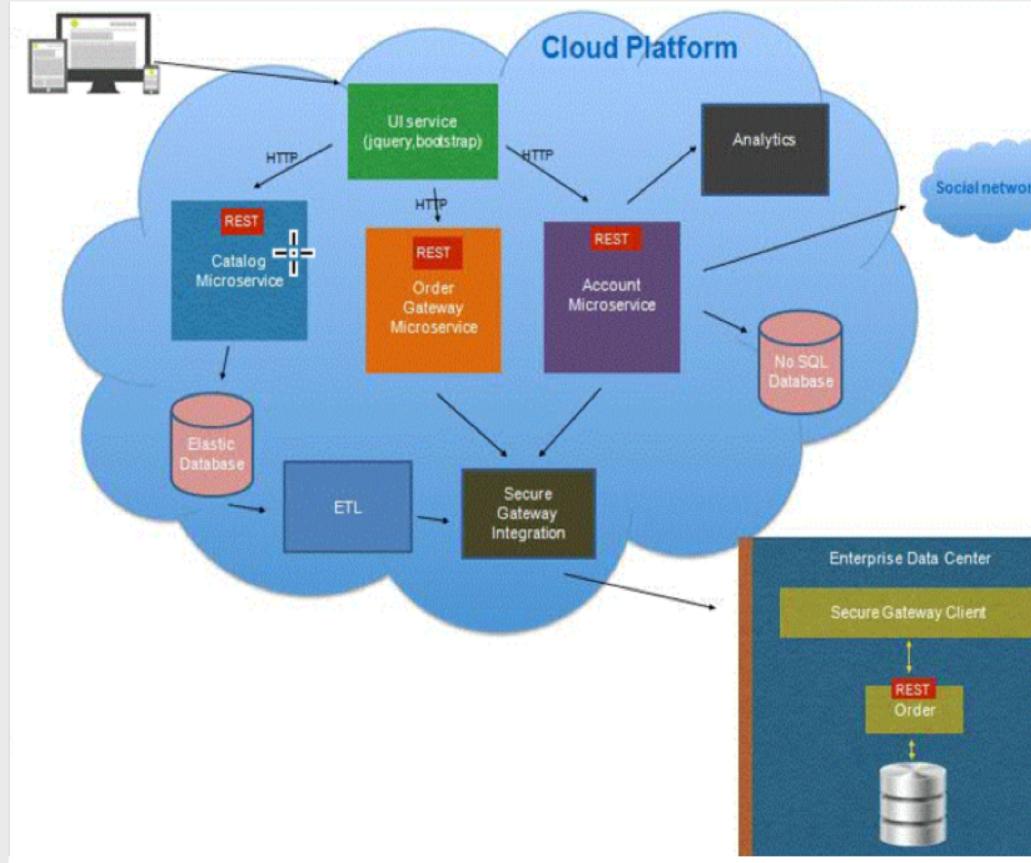
- Improved targeted experience

Order microservice wraps on-prem ordering and uses integration

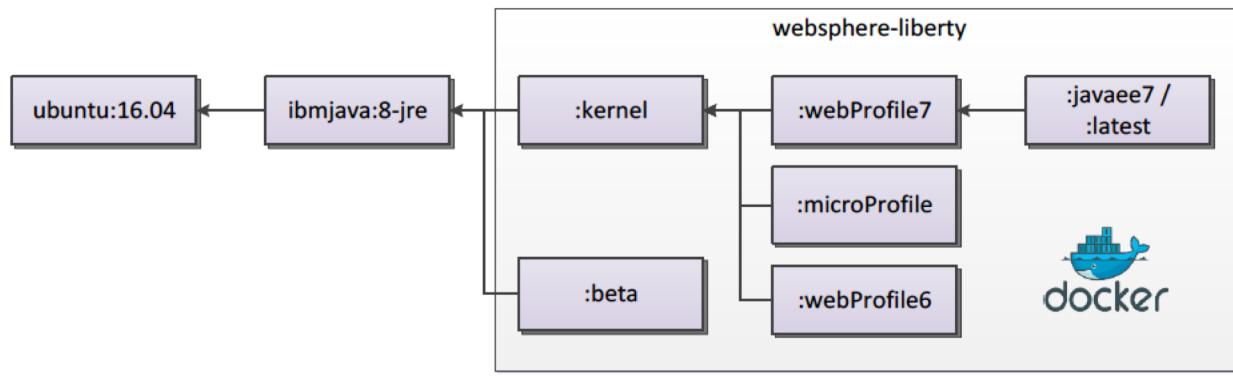
Omnichannel functions:

- New Mobile App uses new microservices
- Existing Website used with routing /

Strangler pattern to evolve



Why WebSphere Liberty?

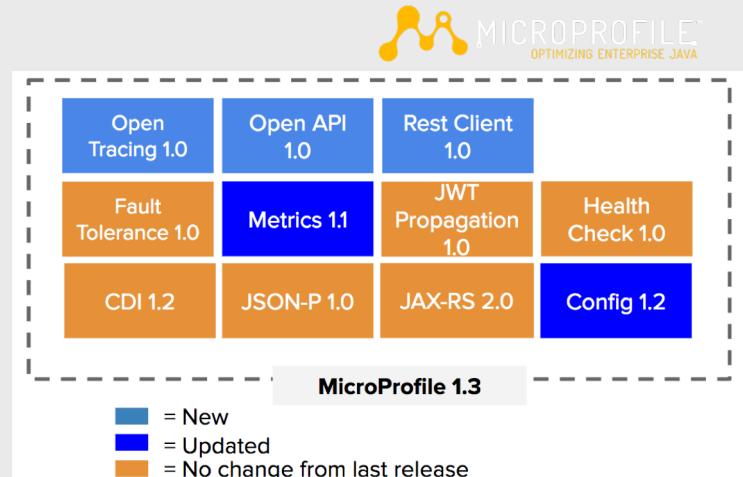


Migrate to Cloud
enabled full Java EE7 runtime

Migration automation
and acceleration with
Transformation Advisor

Modernize with MicroProfile for microservice refactoring

Open Liberty - open source Liberty with Java EE7 and MicroProfile capabilities



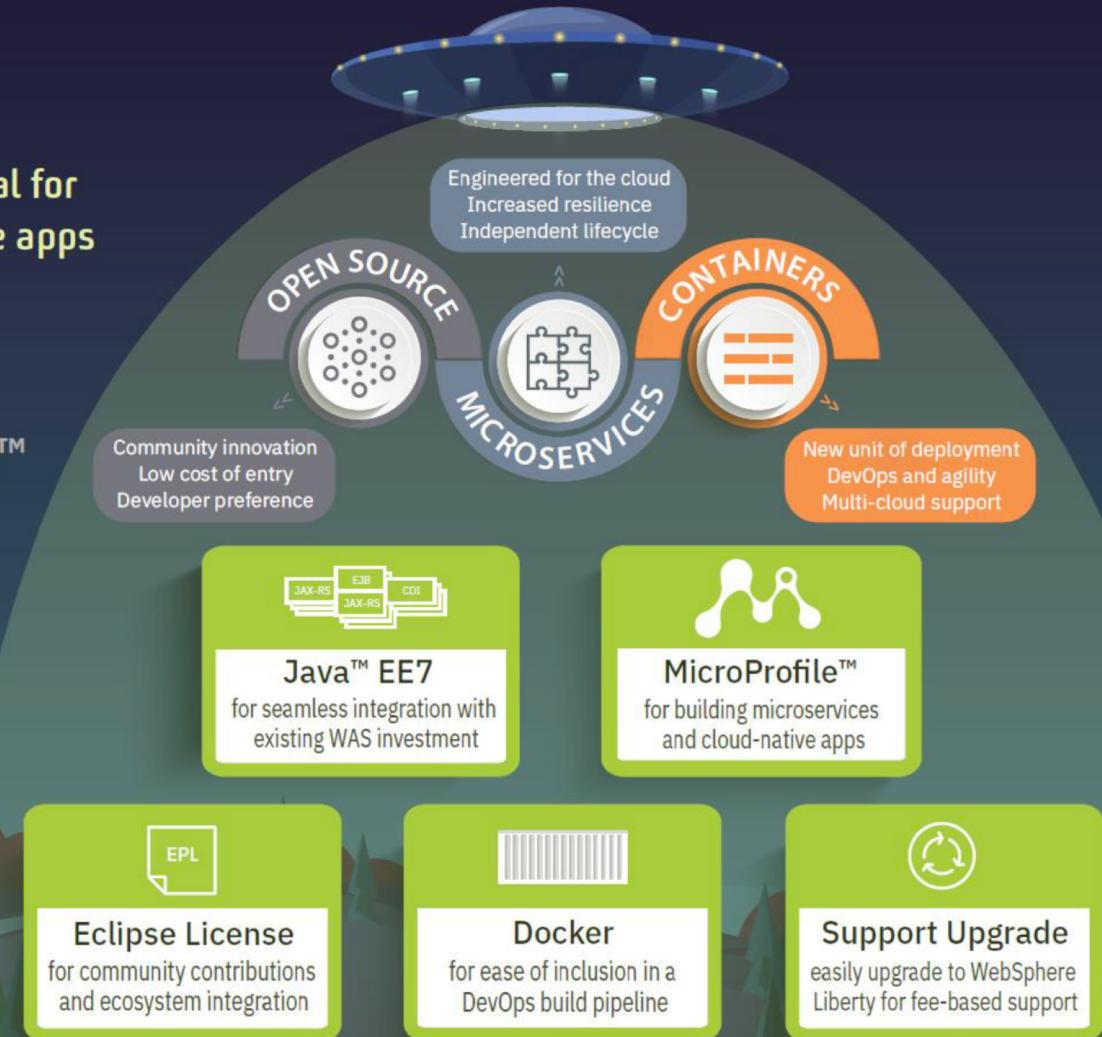


Open Liberty

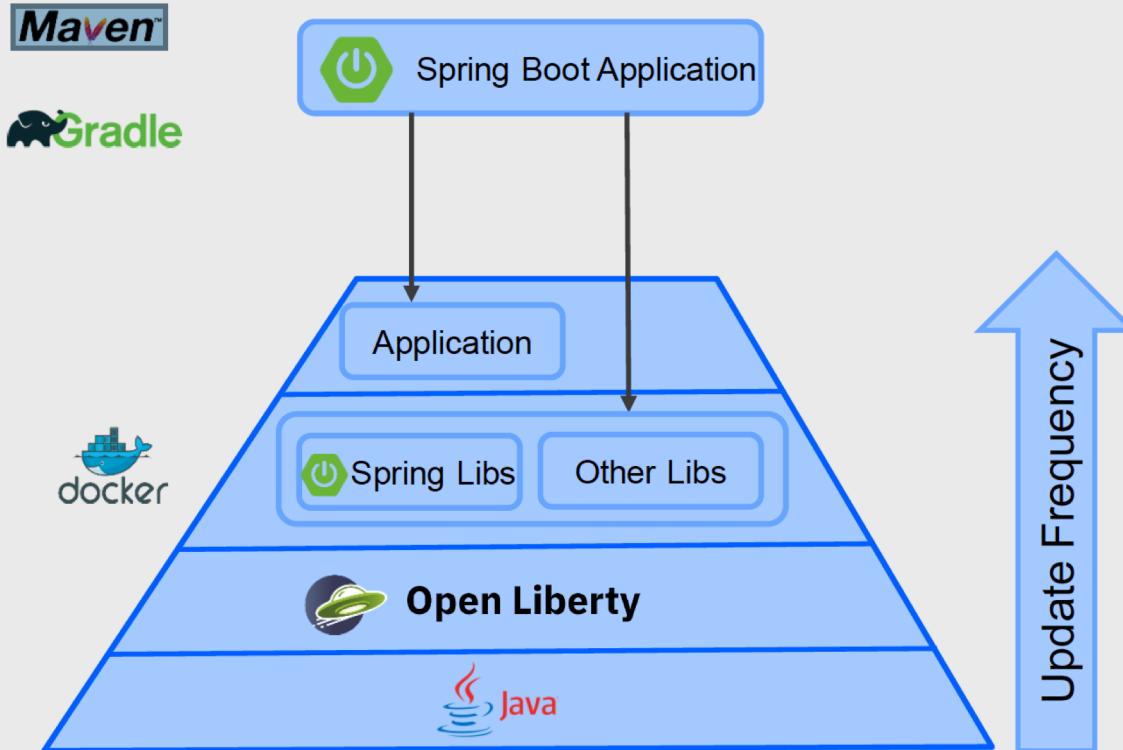
A lightweight open source server runtime ideal for building Java™ microservices and cloud-native apps

- Easy to consume
- Deploy on any cloud for Java™
- Seamlessly transition to WebSphere

<https://openliberty.io/>



Spring Boot applications on Liberty



Liberty Spring Boot Starter to put Liberty in your Boot app.

Or get modern and skinny down your fat boot jar:

- Deploy Spring Boot Apps on Open Liberty without change
- Use the tools of your choice
- Automatically manage dependencies separately from the app content
- Optimized Docker deployment by keeping the application layer small and efficient to update

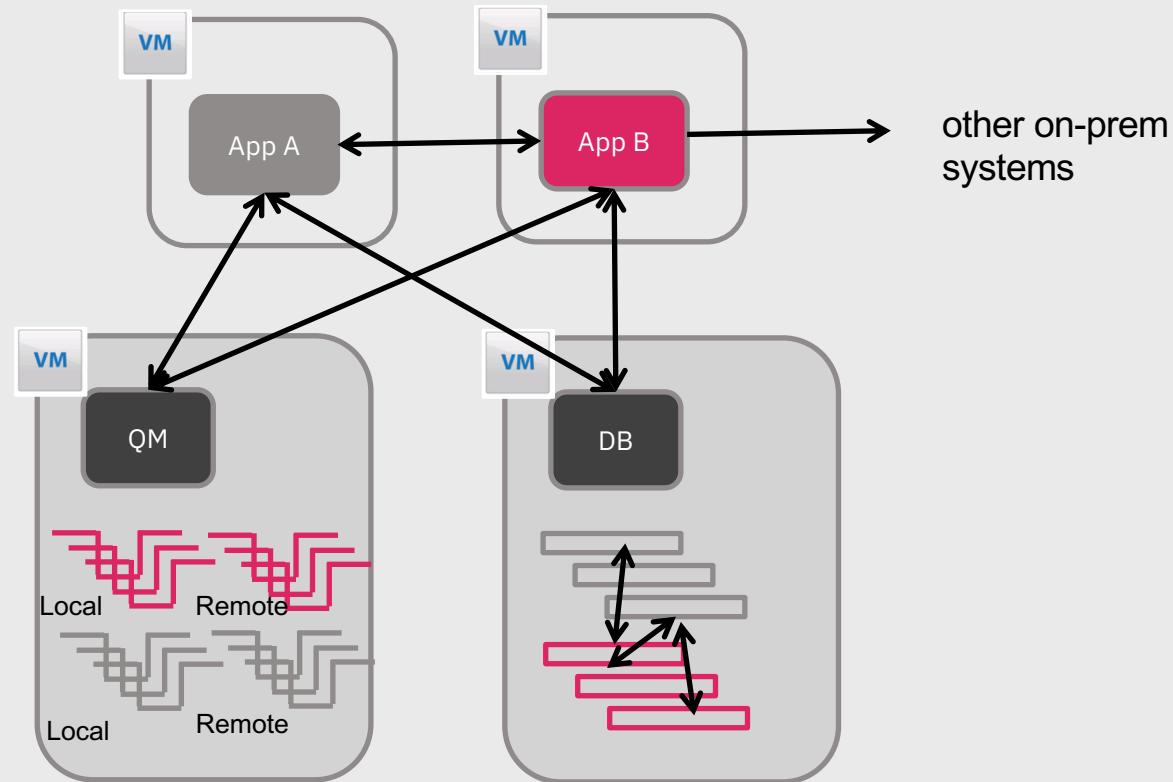
AppMod @3000ft



**Modernize
Middleware**

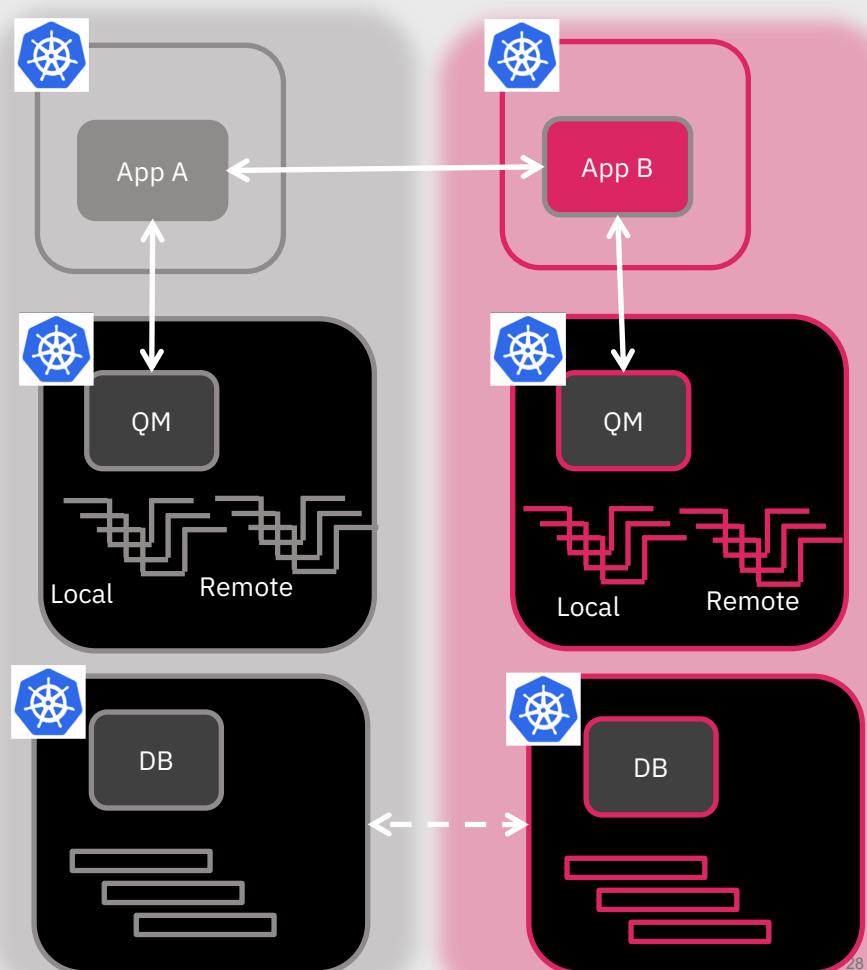
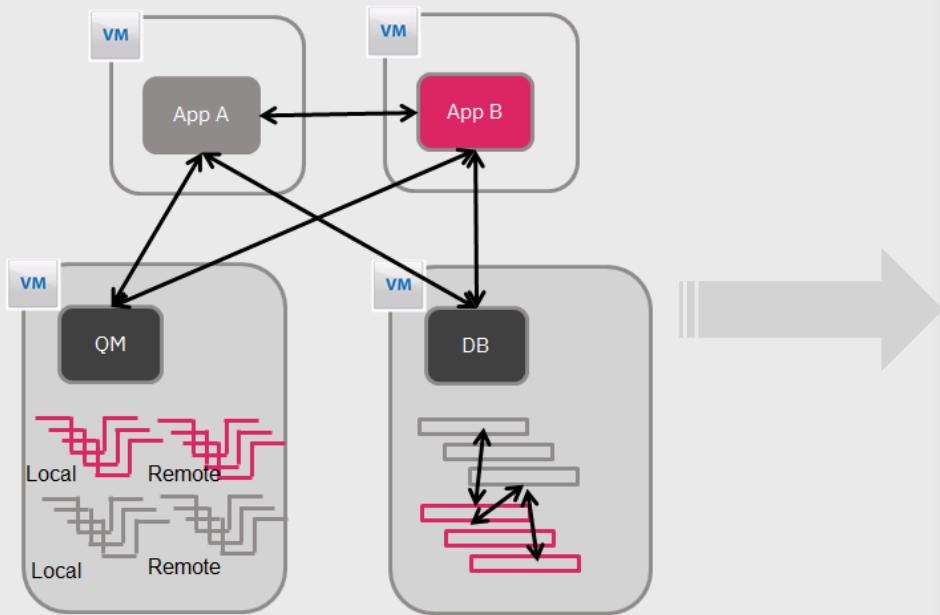
Traditional middleware deployment “Hairball”

.. is what business calls “an app”

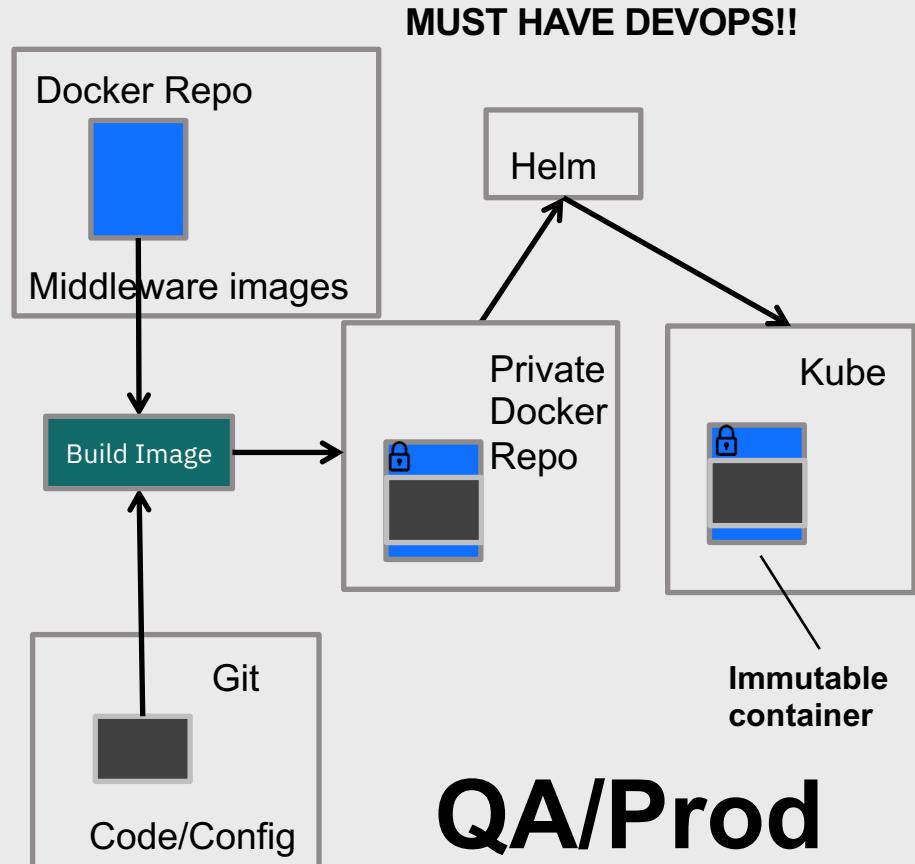
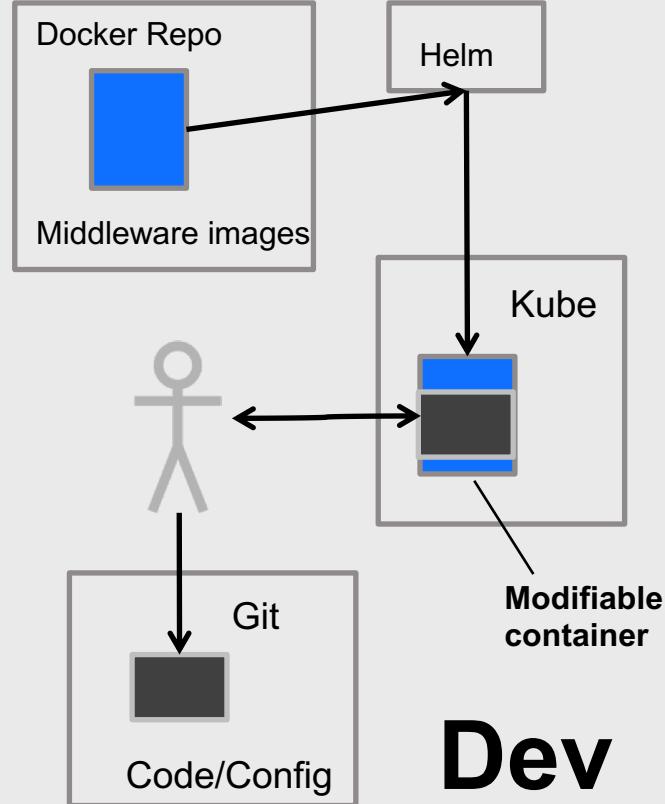


Data “hairball” to rule them all

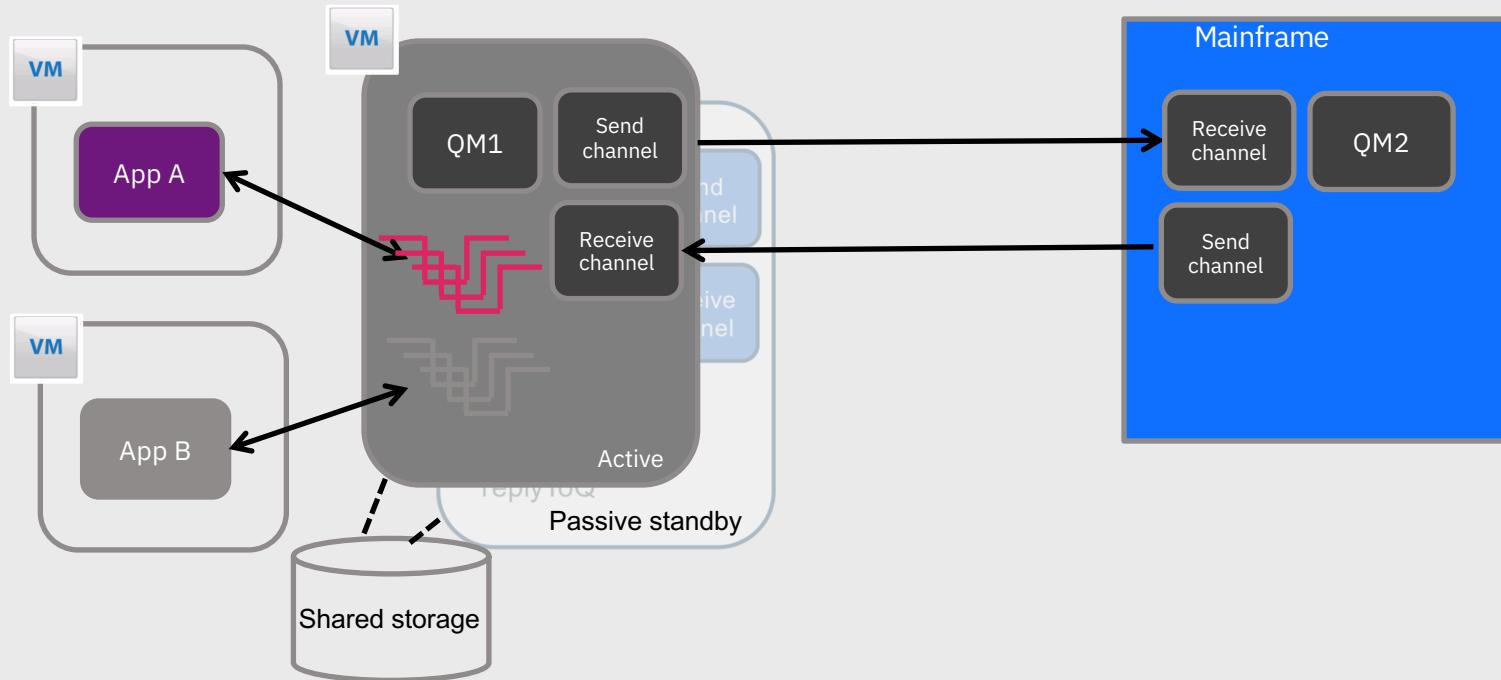
Untangling the hairball with containerized middleware microservices



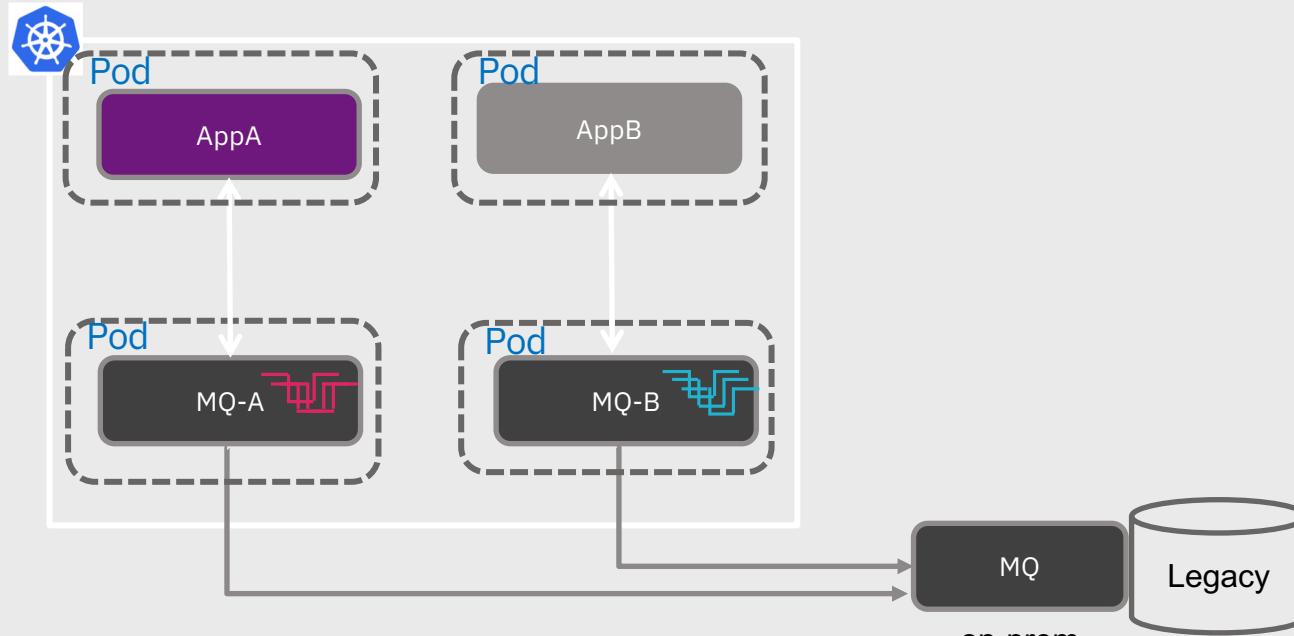
Deploying containerized middleware



App is MQ Client – Traditional setup



Disentangled messaging – MQ “microservices”



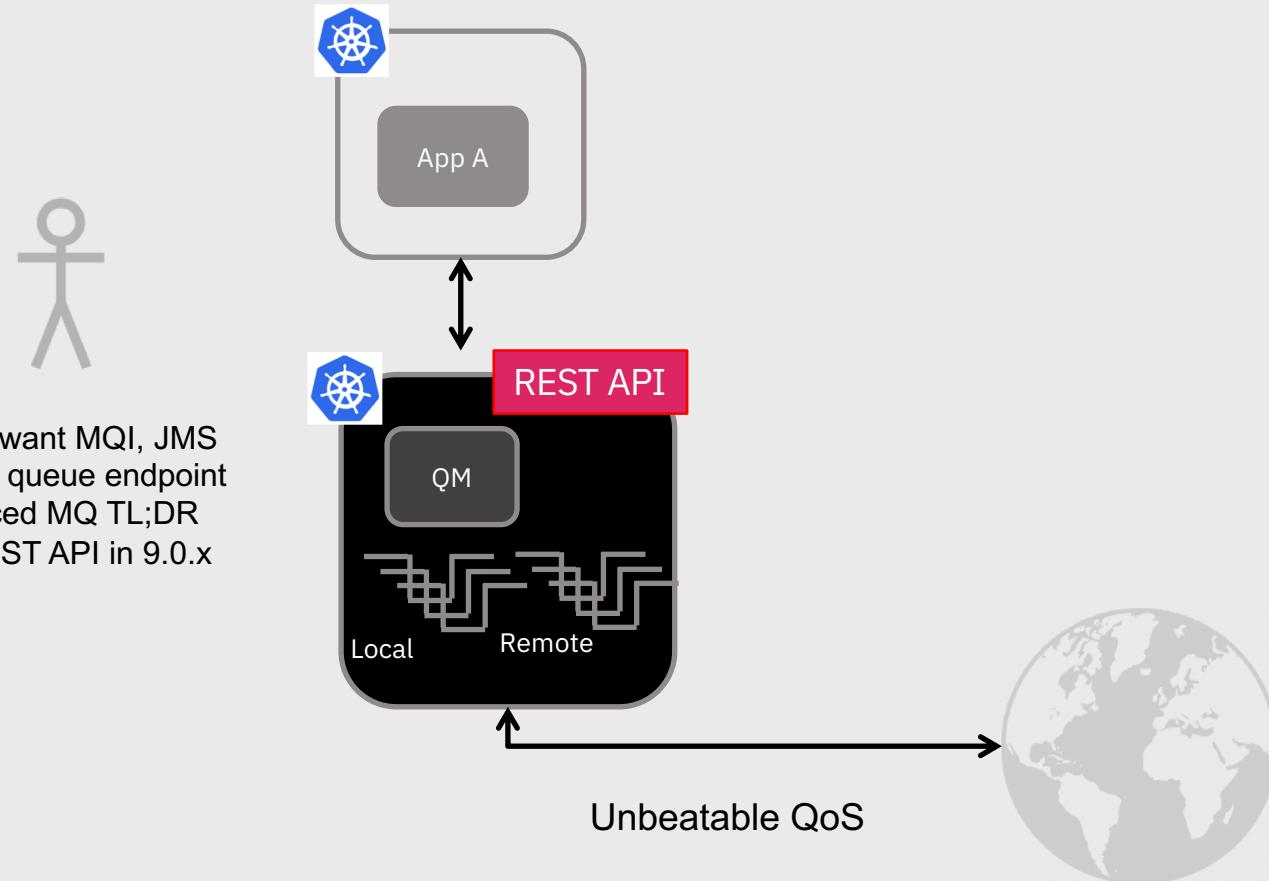
What

- Un-share MQ servers
- Use dedicated MQ containers for each app client
- Failover is just rescheduling MQ pod

Why

- Running containers are immutable
- Cannot have “MQ admin” manage queues in running instance

Modernize cloud development experience with enterprise middleware microservices



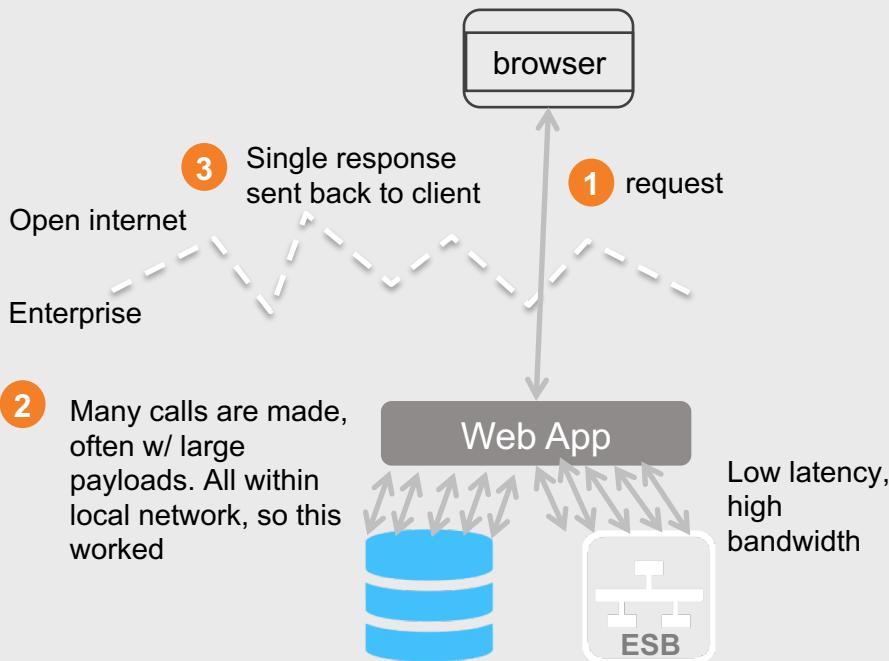
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**API
Integration**

Digital apps present new integration challenges

Traditional web apps

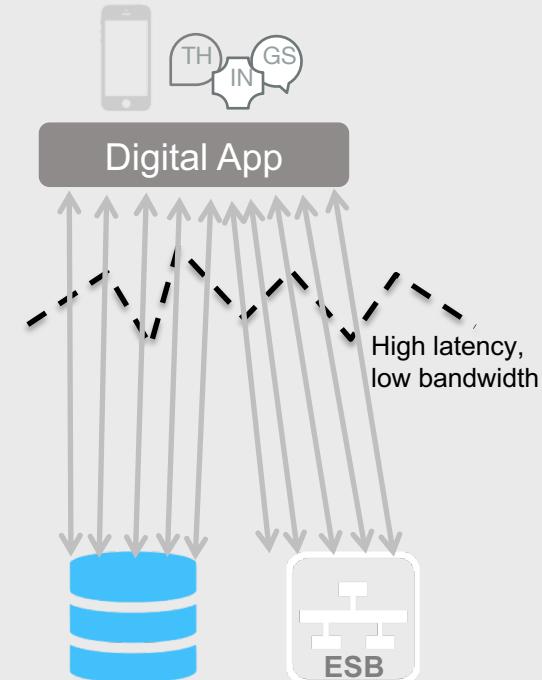


If digital apps used same approach...

Digital apps live in the internet (phones, IoT, dynamic web pages)

High latency make traditional integration approach untenable.

Cannot simply reuse existing services for new digital apps – need a new approach

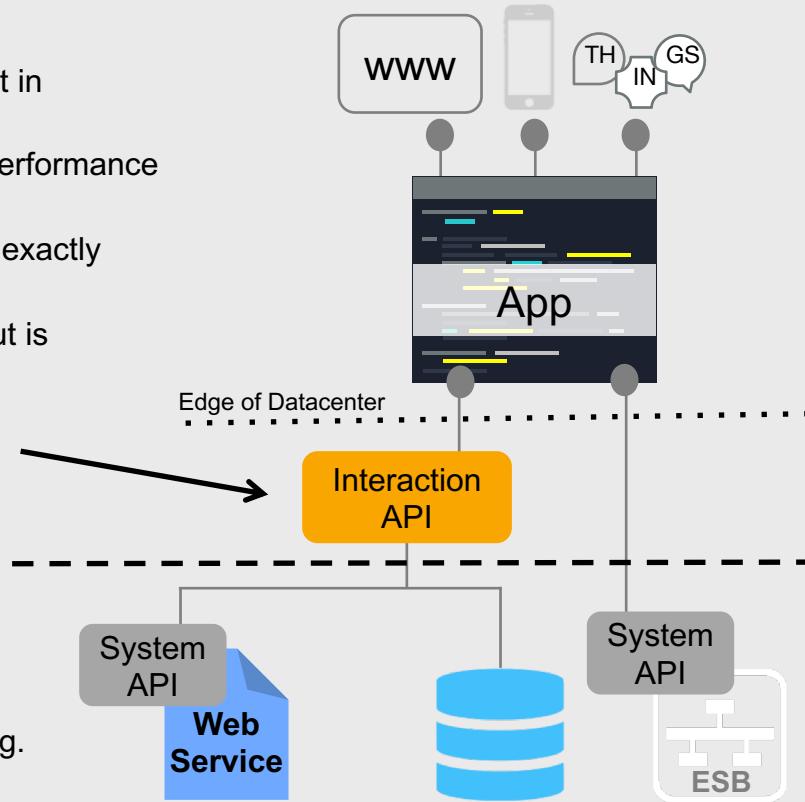


Digital applications require a new interaction tier

Digital Team / Line-of-Business

Measured on time to market. Motivated to be fast (e.g. “get it out, fix it in market”).

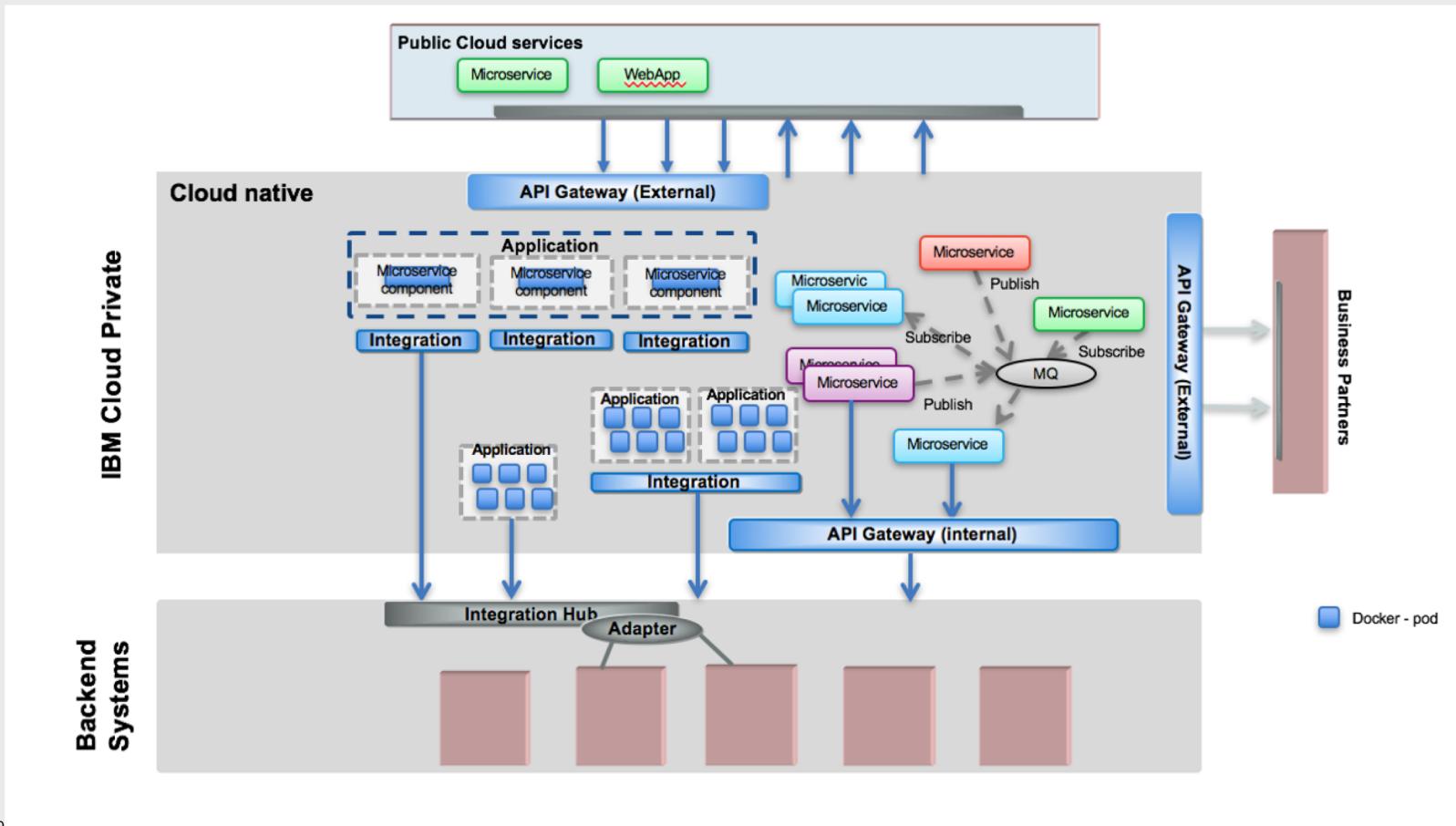
- Cannot simply call existing System API's from digital apps for performance reasons (see previous slide)
- Cannot afford to wait weeks/months for a new System API that exactly meets their needs
- **Needs a NEW tier** which sits close to the systems of record, but is controlled by the Digital Team/LoB



Central IT Team

- Measured on resiliency & uptime.
- Motivated to be cautious.
- Generally takes weeks/months to turn around change requests (e.g. to support digital apps), due to change control & quality control processes.

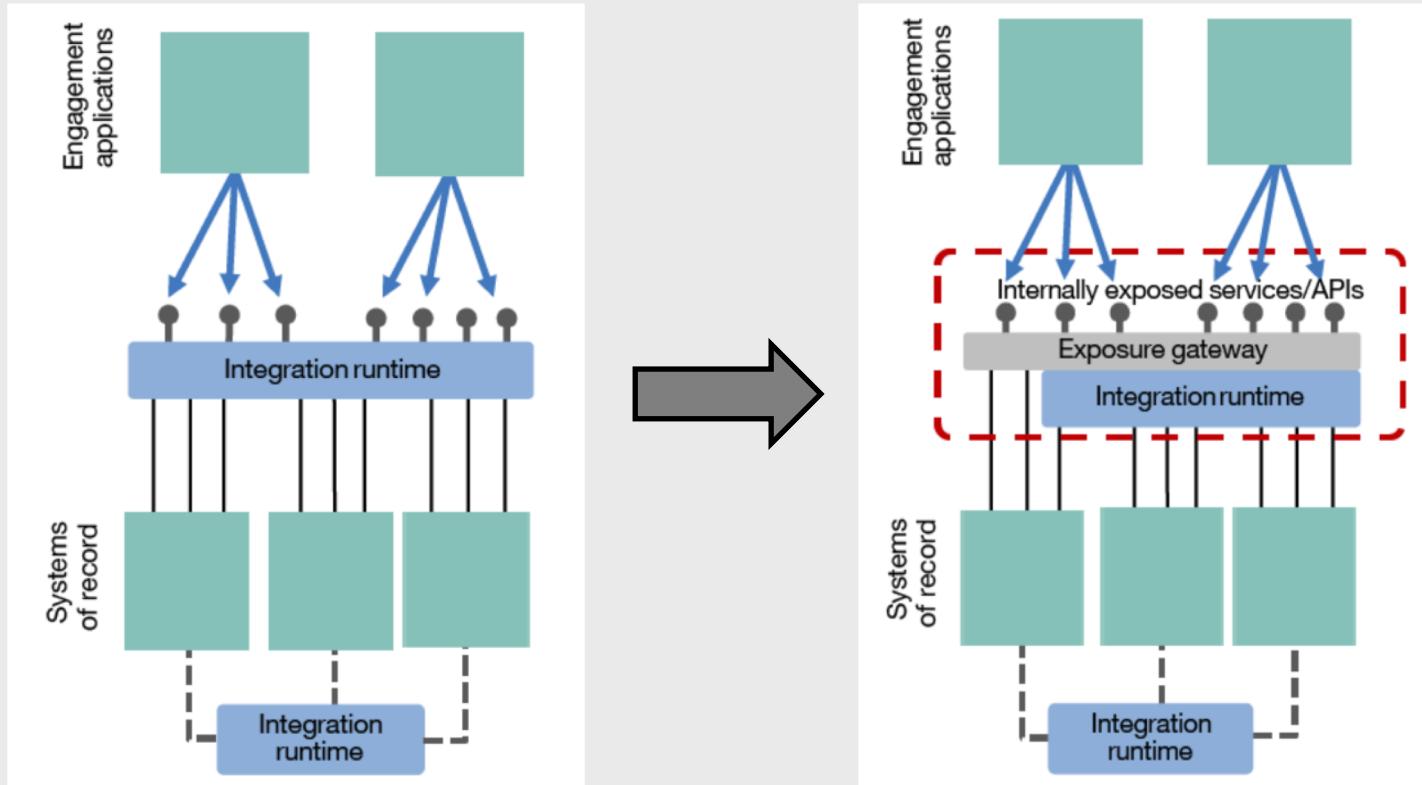
API Integration Patterns





Enhancing existing ESB pattern

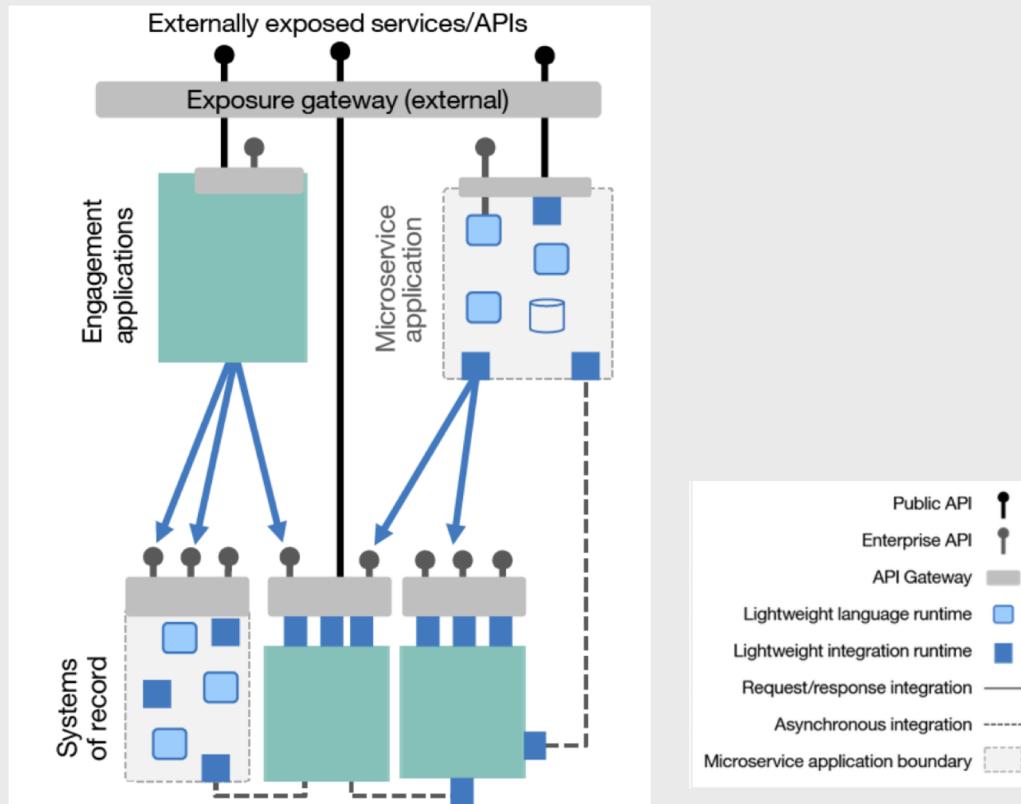
Augment



Breaking up the centralized ESB into independently maintainable and scalable pieces



Refactor

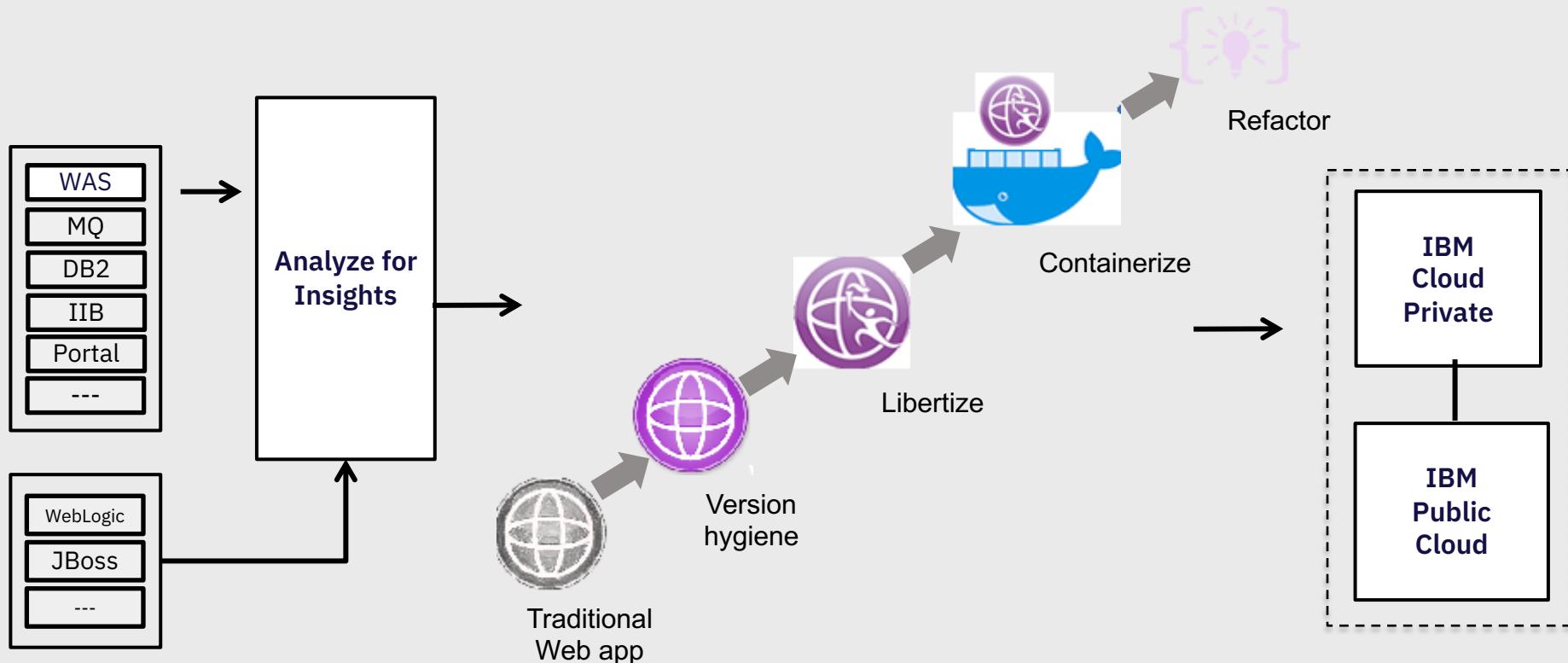


AppMod @3000ft



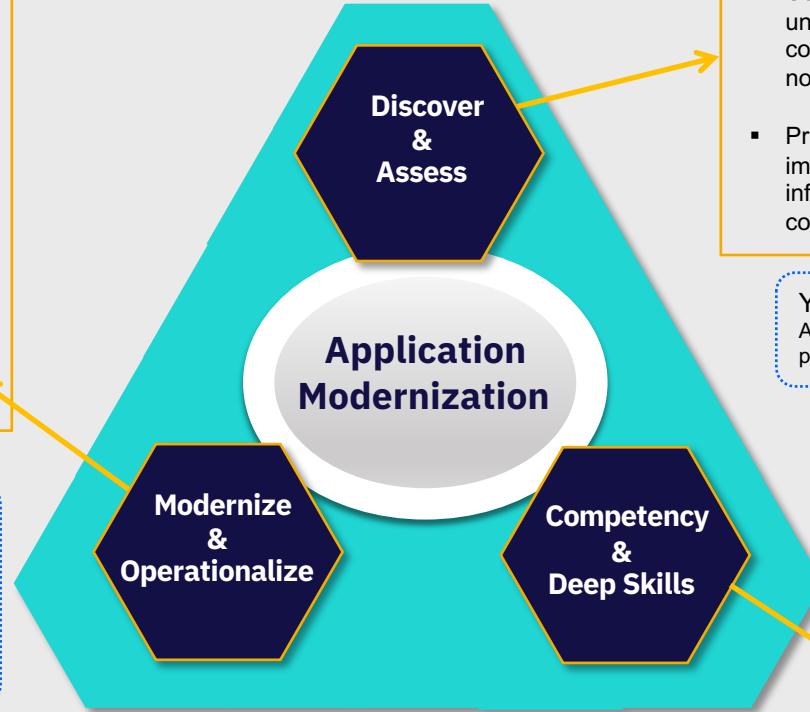
Summary

Accelerate the cloud adoption journey



Garage Services for Application Modernization

- Get a functional private cloud
- Move application to cloud: Your developers will begin learning the IBM Cloud Garage Method by engaging in experiential learning as you work side-by-side with IBM SMEs to modernize applications
- Learn the best tools and techniques to operate the newly modernized cloud application including an analysis of current operations, runbook review, and management dashboards



You get:
IBM Cloud Private (ICP) + DevOps toolchain setup in non-prod environment with
Minimum Viable Product for migrating containerized apps to ICP
(may include some re-factoring and/or re-platforming).

- Using IBM's Cloud Transformation Advisor tool, understand the applications in the environment, components, technology stack, functional and non-functional, dependencies and processes
- Prioritize candidates (based on assessment) for immediate migration based on application information, value to the business and assessed complexity

You get:
A high level assessment of your overall application portfolio with regard to readiness for modernization

- Enablement Choices : Mix and match one week of training, choose from offerings:
- Option 1: ICP Boot Camp
 - Option 2 : Management and Ops enablement
 - Option 3 : Cloud Native App Dev

You get:
Choice of enablement based on your skills transformation needs

IBM Transformation Advisor

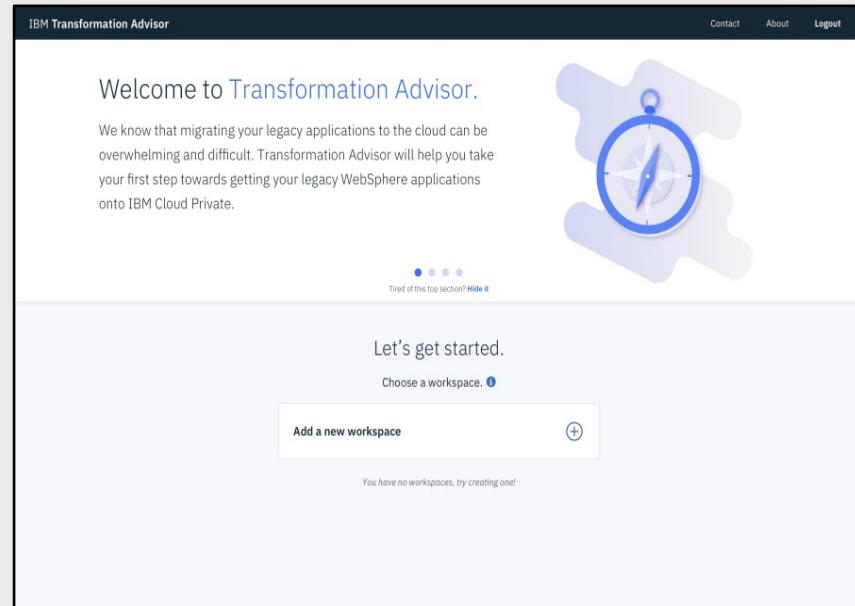
Collects information about an existing WebSphere environment and applications.
Combines that with rules and insights gained from years of working with WebSphere and
WebSphere applications, and provides recommendations.

Challenges addressed:

- Leveraging existing application logic
- Need to accelerate application development and maintenance
- Monolithic applications that are complex and tightly coupled

Benefits:

- Included and deployed on IBM Cloud Private
- Introspects existing WebSphere Deployments
- Provides recommendations, guidance and artifacts for deployment in Liberty containers and Kubernetes clouds



IBM Microclimate

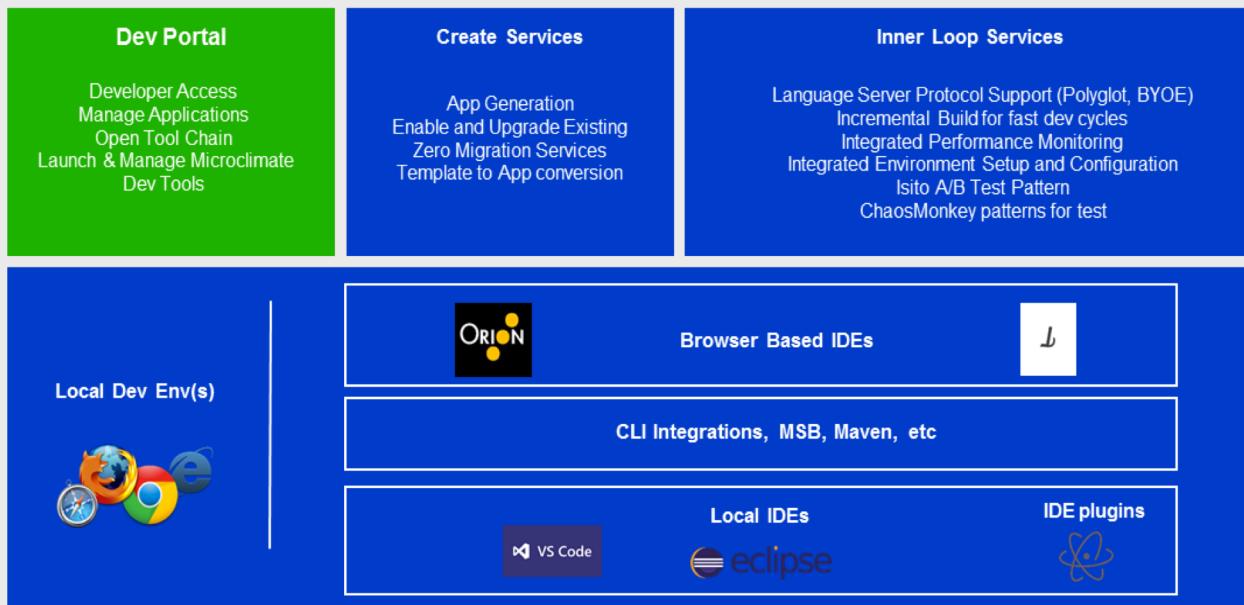
Microclimate is an end-to-end development environment that lets you rapidly create, edit, and deploy applications. Applications run in containers from day one and can be delivered into production on Kubernetes through an automated DevOps pipeline using Jenkins.

LEGEND:

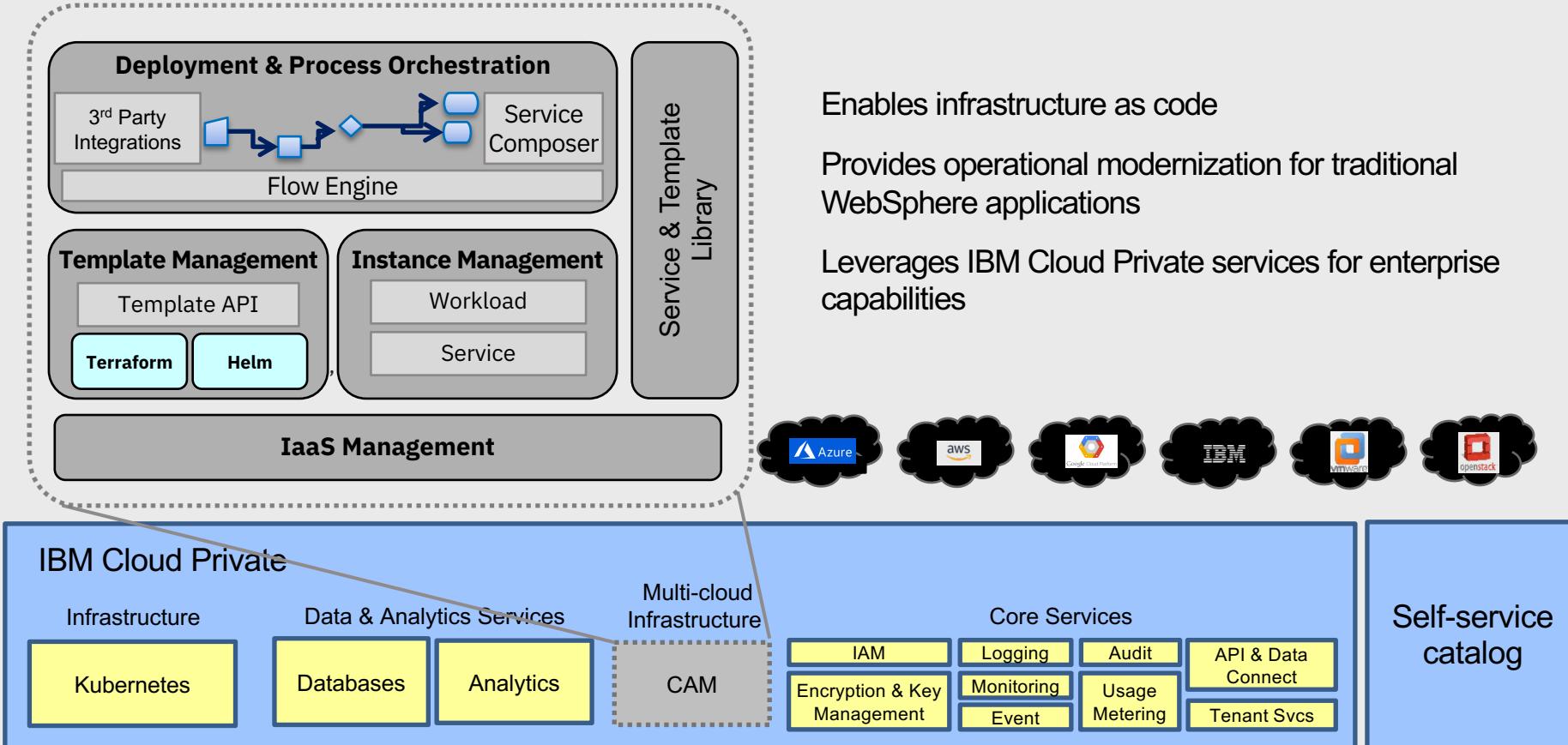
ICP

Microclimate
Local or ICP

Option for 3rd
Party



Cloud Automation Manager



References

IBM Transformation Advisor

<https://developer.ibm.com/app-modernization/>

Microclimate

<https://www.ibm.com/us-en/marketplace/microclimate>

WebSphere Liberty

<http://wasdev.net/>

IBM Cloud Automation Manager (CAM)

<https://developer.ibm.com/cloudautomation/>

Free online Garage Method Courses

<https://www.ibm.com/cloud/garage/content/course/websphere-on-cloud-private>

IBM App Modernization Field Guide -

<https://www.ibm.com/cloud/garage/content/culture/app-modernization-field-guide/>

WebSphere Application Server Migration Toolkit

<https://www.ibm.com/developerworks/library/mw-1701-was-migration/index.html>

