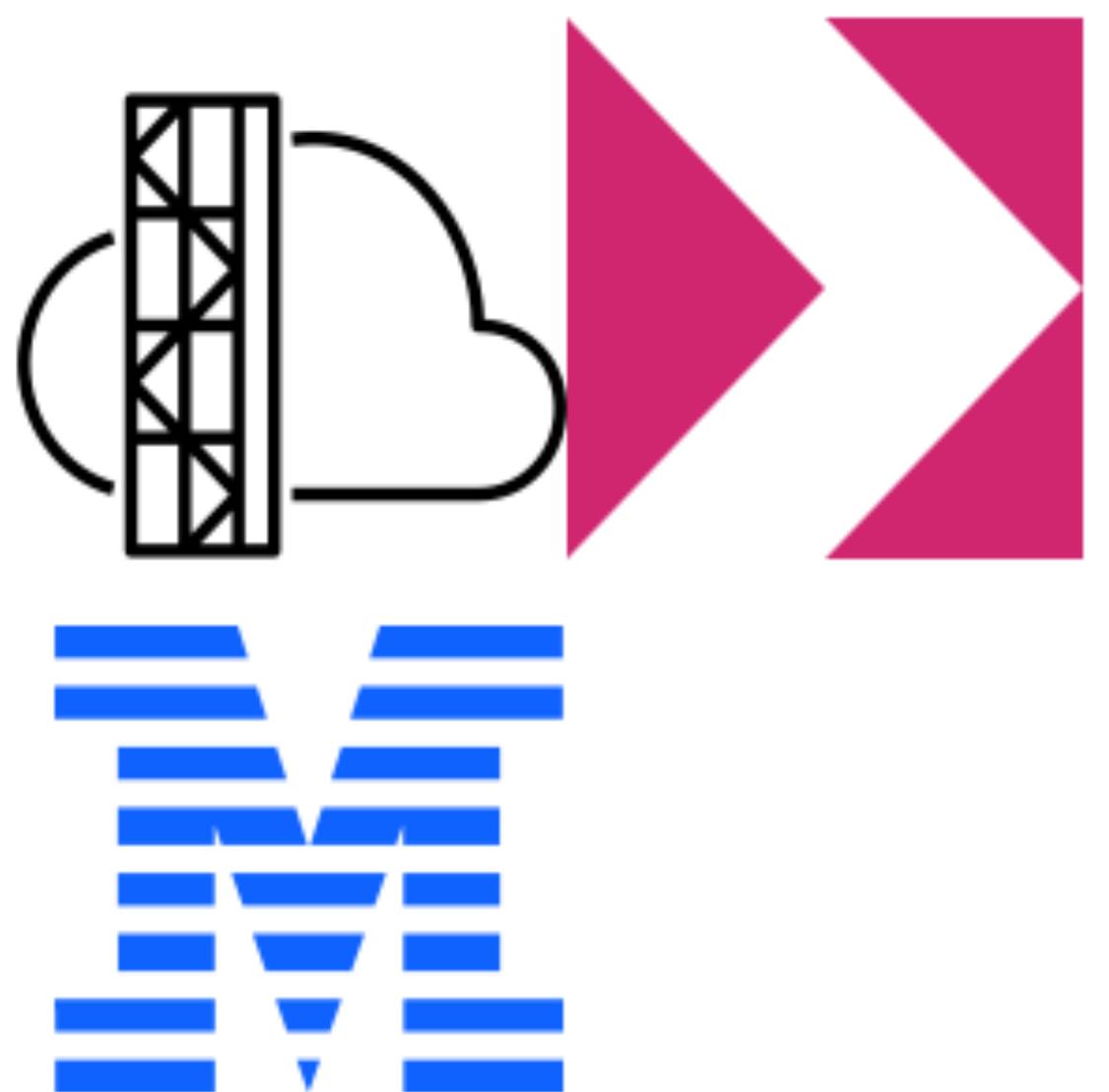
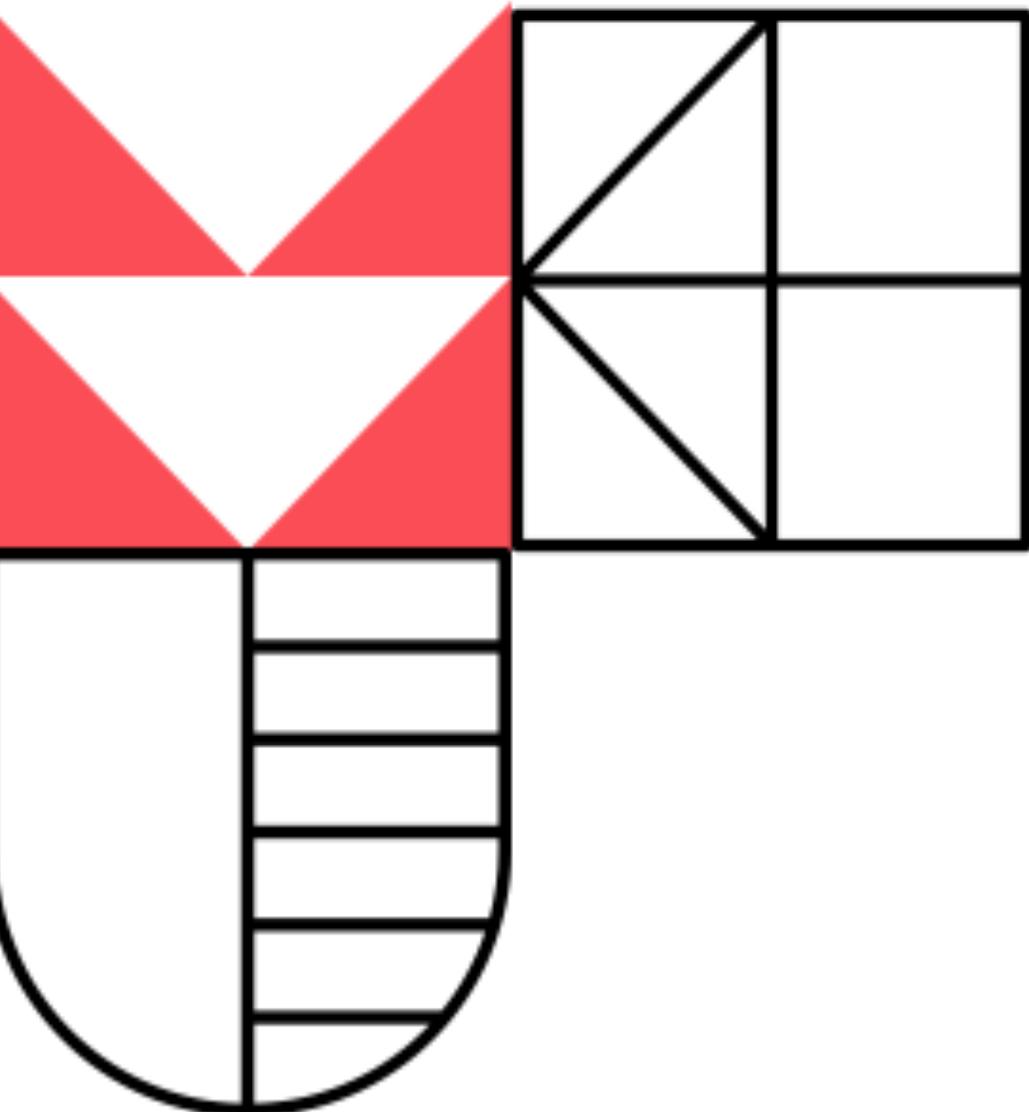
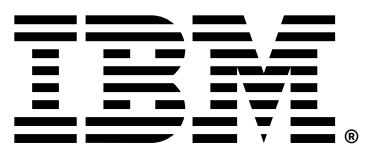


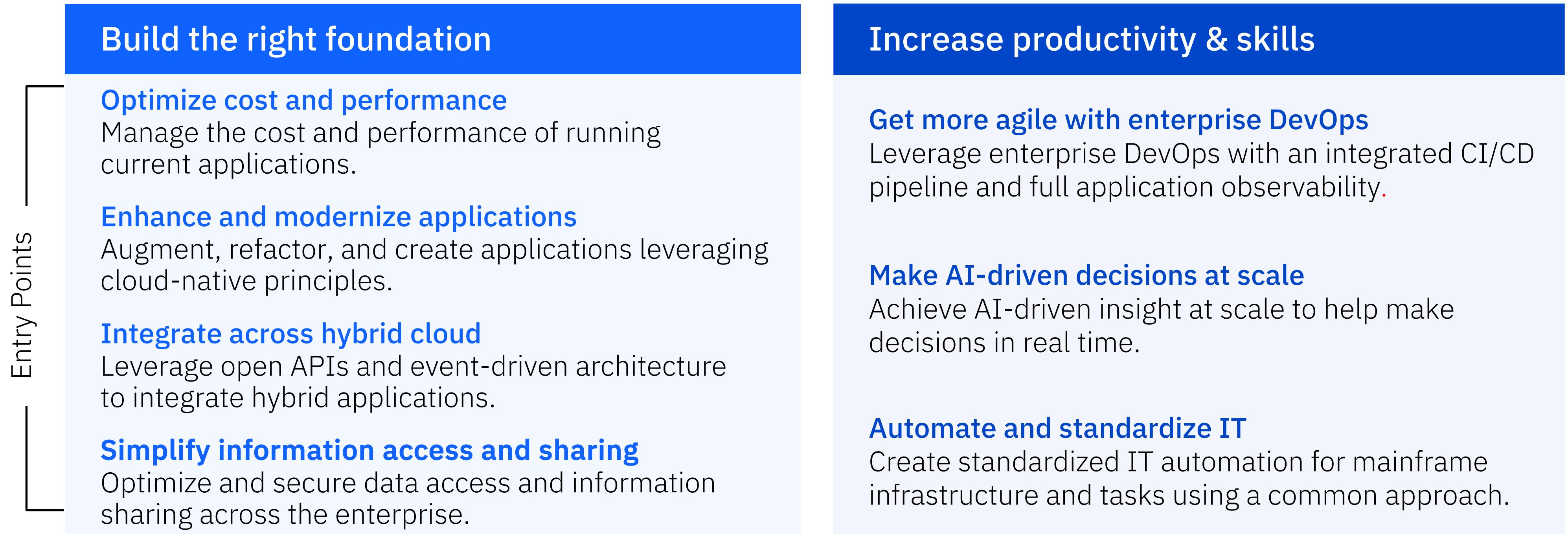
# 1378: Better practices to accelerate mainframe application modernization with public cloud

Mike Fulton  
IBM, Distinguished Engineer - IBM Z Application Foundation

September 11–14, 2023  
MGM Grand, Las Vegas



# IBM's approach lets you continuously modernize applications & data on IBM Z and Cloud



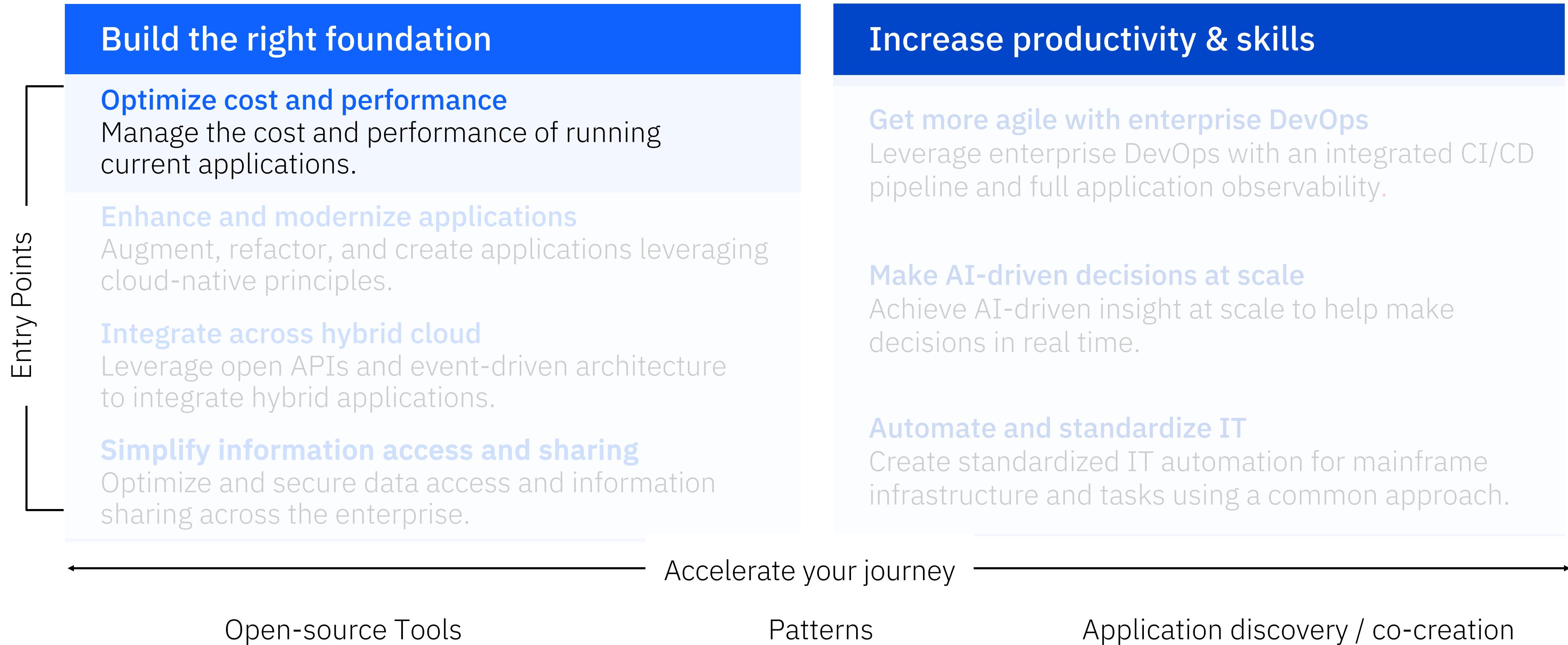
← Accelerate your journey →

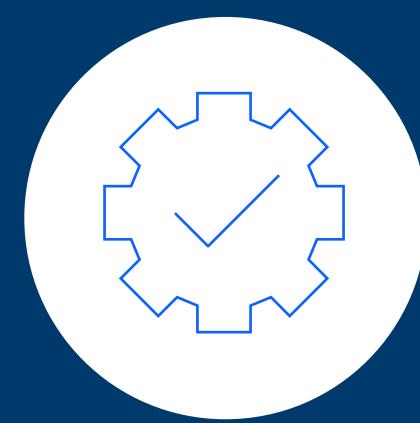
Open-source Tools

Patterns

Application discovery / co-creation

# IBM's approach lets you continuously modernize applications & data on IBM Z and Cloud

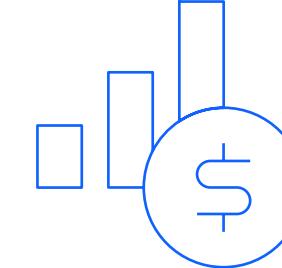
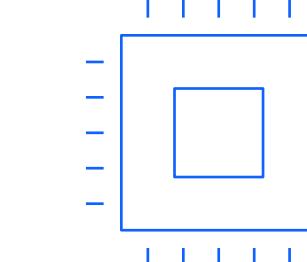
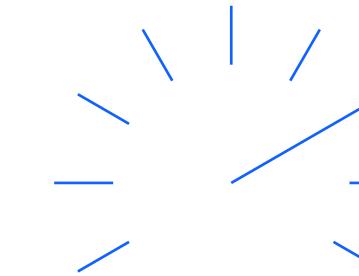
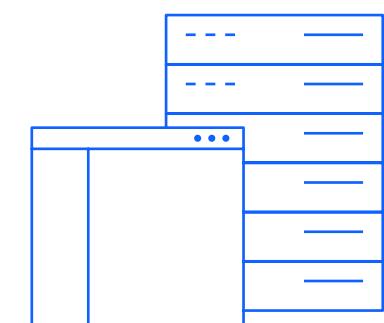




## Optimize cost and performance

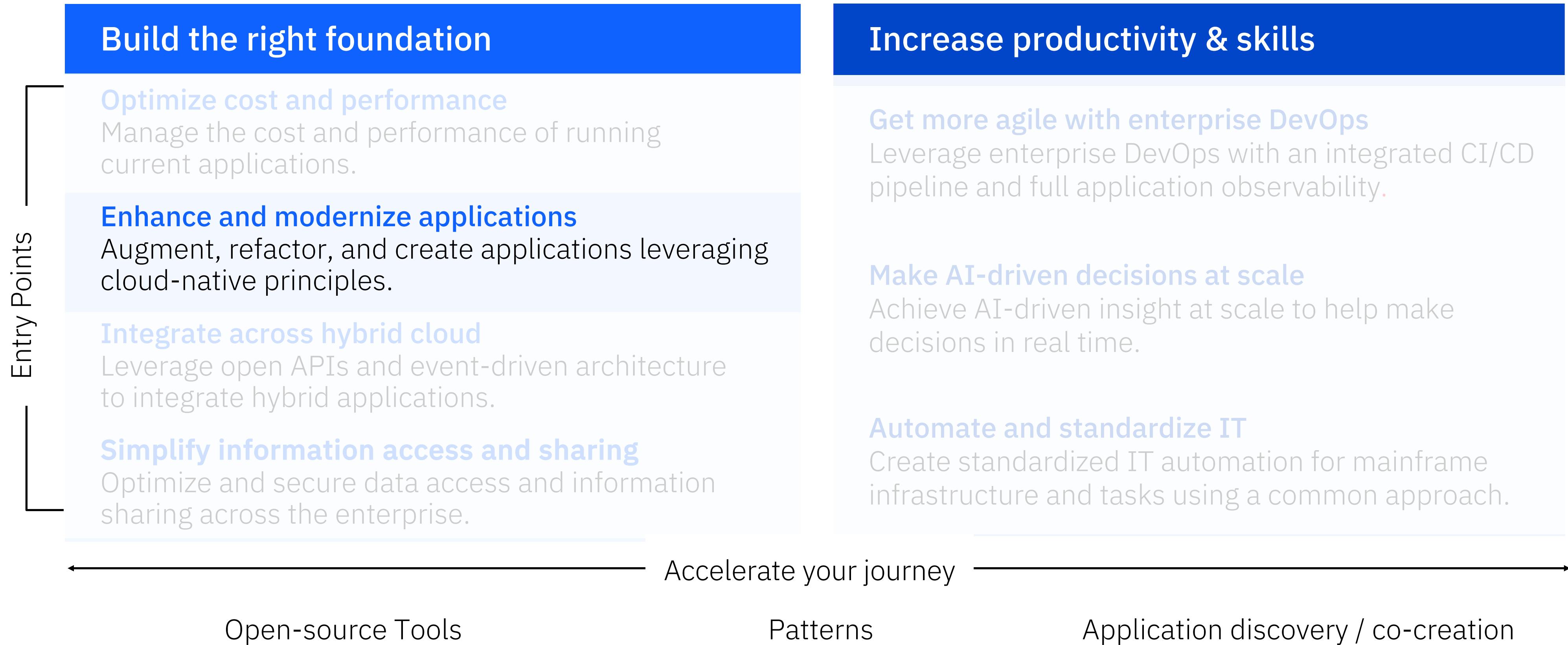
Address perceived performance challenges from down-level elements of the mainframe deployment

Enable “cloud like” flexible pricing



HW/SW Currency	Performance	Specialty Processors	Consumption-based Pricing
Latest software enhancements can improve performance without changing code	Improves the performance of COBOL programs	zIIP <sup>1</sup> and IFL <sup>2</sup> support new technologies and reduce costs for new applications on IBM Z	Cloud-like, software and hardware consumption-based pricing options for IBM Z
<b>IBM z/OS software, z16</b>	<b>COBOL 6.4, Automatic Binary Optimizer</b>	<b>zIIP<sup>1</sup> and IFL<sup>2</sup></b>	<b>Tailored Fit Pricing</b>

# IBM's approach lets you continuously modernize applications & data on IBM Z and Cloud



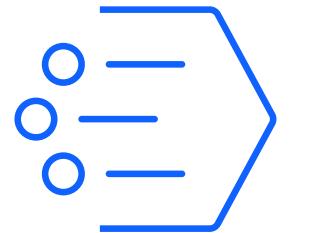


## Enhance and modernize applications

Use the “best fit” language to enhance and develop new applications

Innovate faster by leveraging “ready-to-go” packages instantly

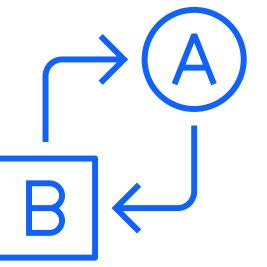
Attract millions of developers with open-source languages



### Extend

Extend or add new capabilities to existing business-critical applications

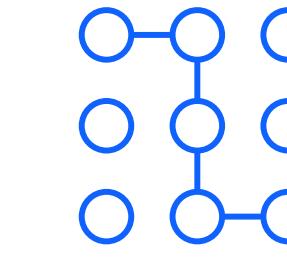
New features in COBOL, PL/I, C/C++ and Java



### Refactor

Refactor and easily broaden the capabilities of the existing COBOL programs with Java

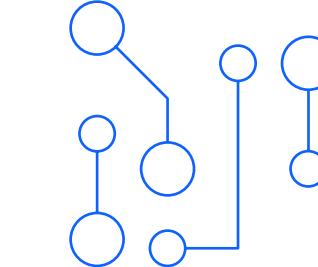
COBOL-Java, PL/I-Java interoperability, IBM wCA for Z



### Enhance

Develop new applications written in Node.js, Python or Go that interoperate with existing applications

Node.js, Python, Go, Java/Semeru

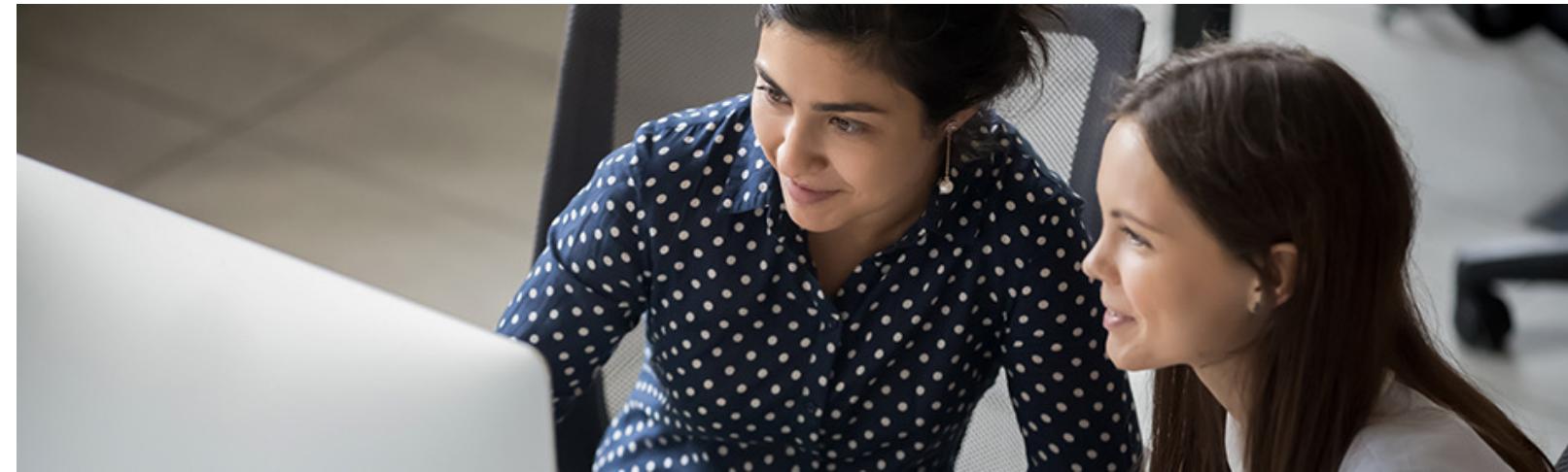


### Co-locate

Improve latency and increase throughput by collocating cloud-native applications with z/OS applications

Node.js, Python, Go, Java/Semeru, RHOS on zLinux or zCX

# Using Java for application modernization



## A national social security fund

Used **Java** to create a new interactive app for citizens, implemented in Liberty with Spring MVC. Using JCICS for COBOL/Java made it very easy in developing new Java based functions in CICS with MQ and Db2 integrations.

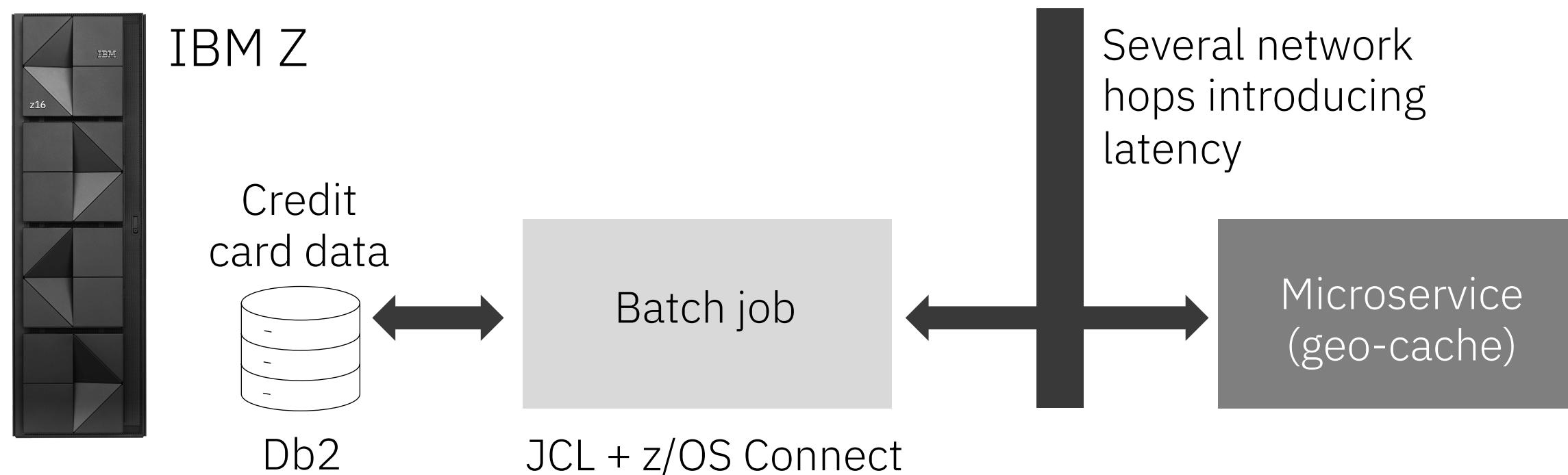
## An IT service provider

Introduced **Java** alongside COBOL in IMS to accelerate creation of new services and extend the life and value of their existing applications. Solution enabled COBOL<->Java interoperability and ensured data integrity across IMS, Db2, and MQ.

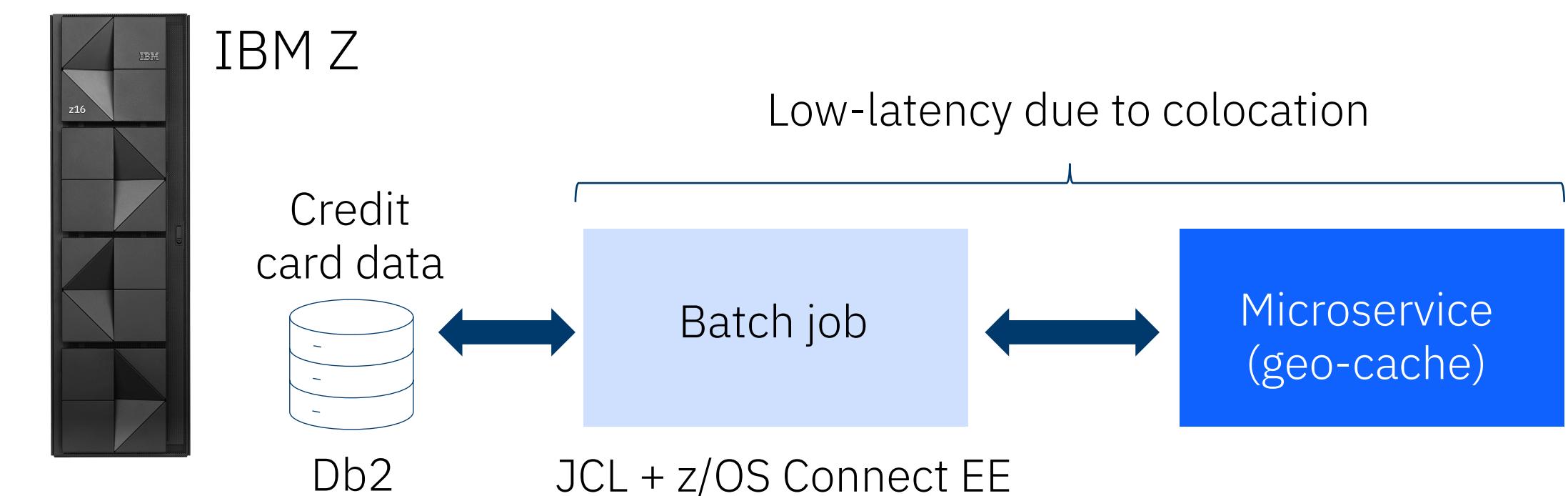
## A financial institution

A batch application in **Java** microservices running on distributed was collocated on Z to meet SLA requirements by reducing network latency without needing to change the code. Latency was significantly reduced by 7-15 times, and batch window times were reduced by an order of magnitude.

## Before



## After

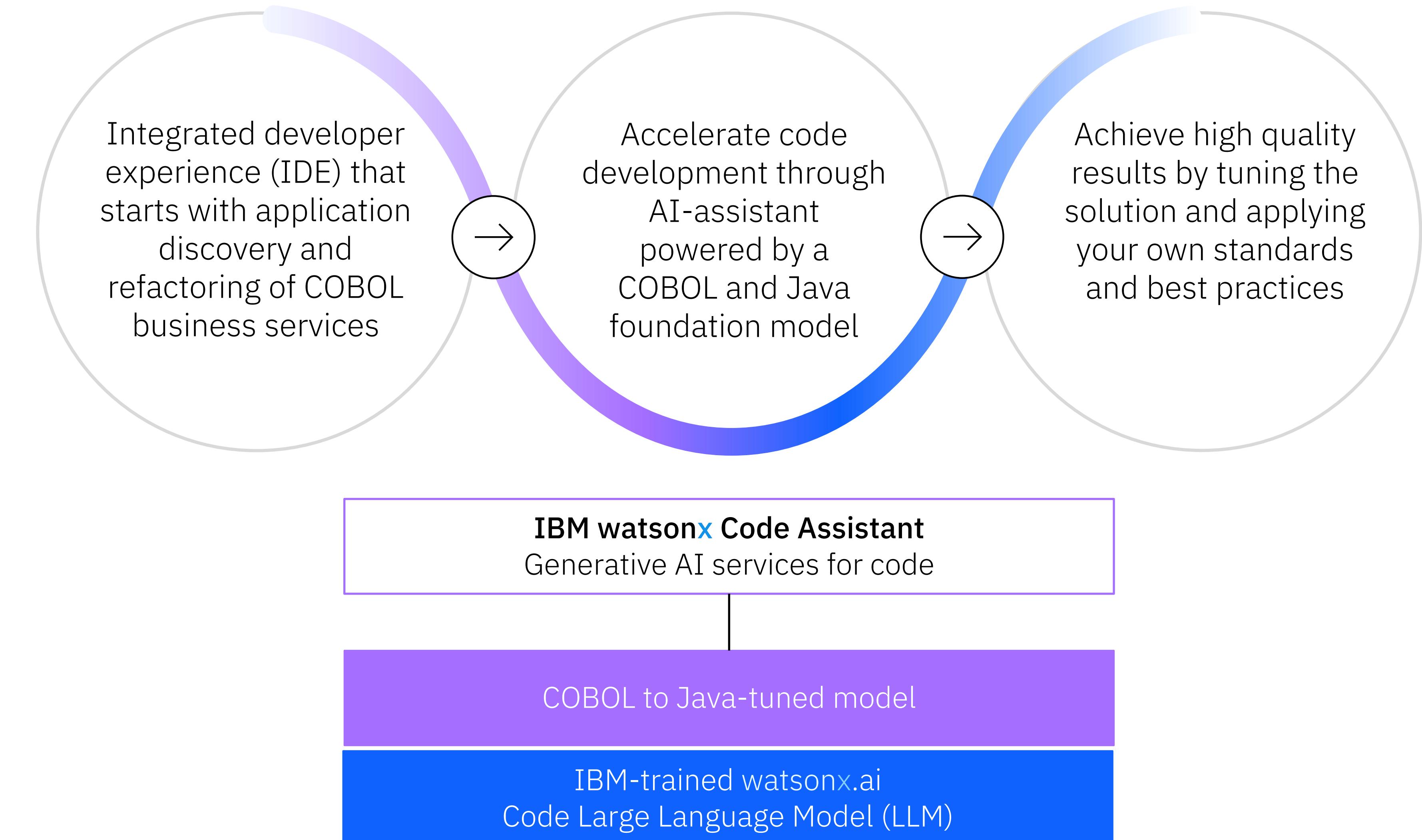


# AI-generated high-quality code

## Objectives:

- Well-architected object-oriented AI generated Java
- Optimize for mainframe middleware and z/OS Java APIs
- Customize for your standards and best practices

Leverage the power of [Generative AI](#) to make it easier for developers to write code with AI-generated recommendations



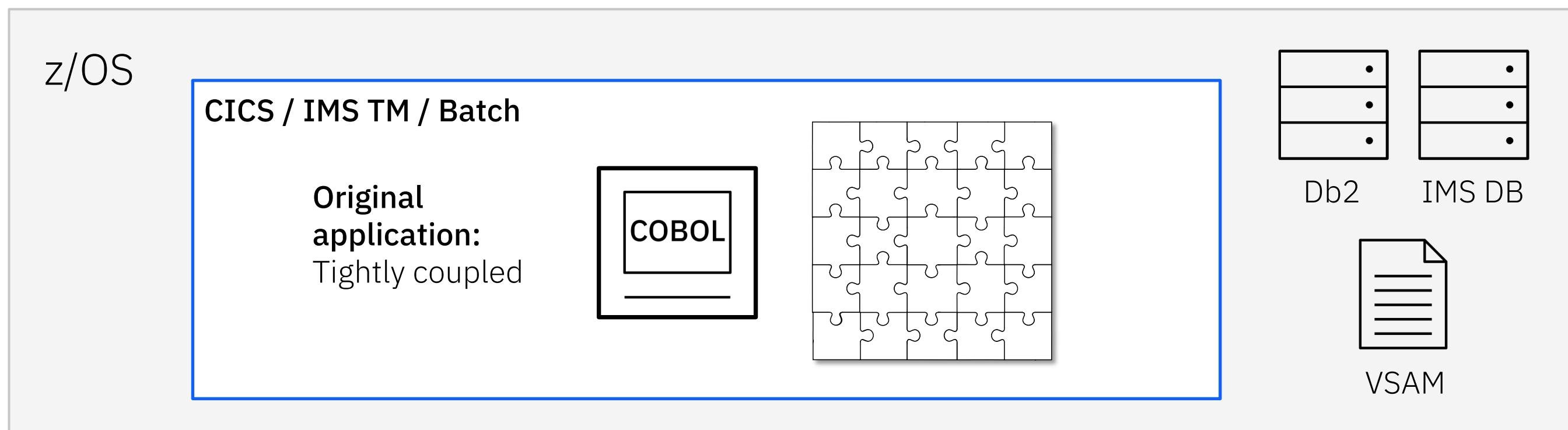
# Interoperability & optimization

## Objectives:

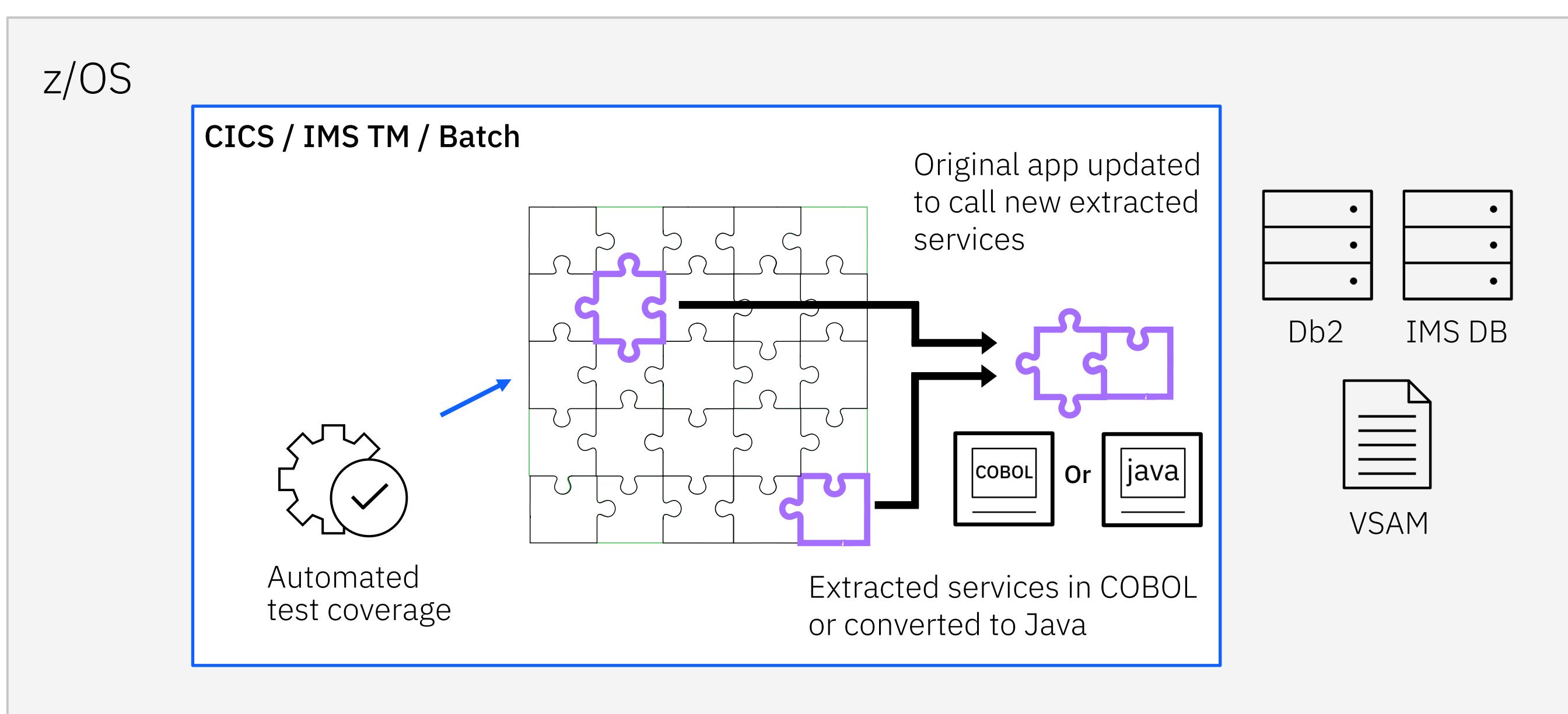
- De-risked approach featuring integration & interoperability while maintaining data and transactional model
- Optimized for IBM Z qualities of service of performance, security, and scalability
- Feature application architecture that identifies best-fit for COBOL and Java

## Transformation with a best-fit approach

### Baseline



### IBM watsonx Code Assistant for Z



# Large European Bank

## Business challenge:

One of the bank's main applications that manages the bank's accounts in foreign currency ("Nostro accounts") is an interconnected IMS application frequently updated. The bank has the following challenges-

Their overall transactions perform multiple business functions with same programs implement several business functions at the same time. At each change, the whole transaction and all business functions need to be wholly tested

## Bank Strategy:

COBOL mainly for maintenance of stable components; Java for z/OS for new features

## Solution:

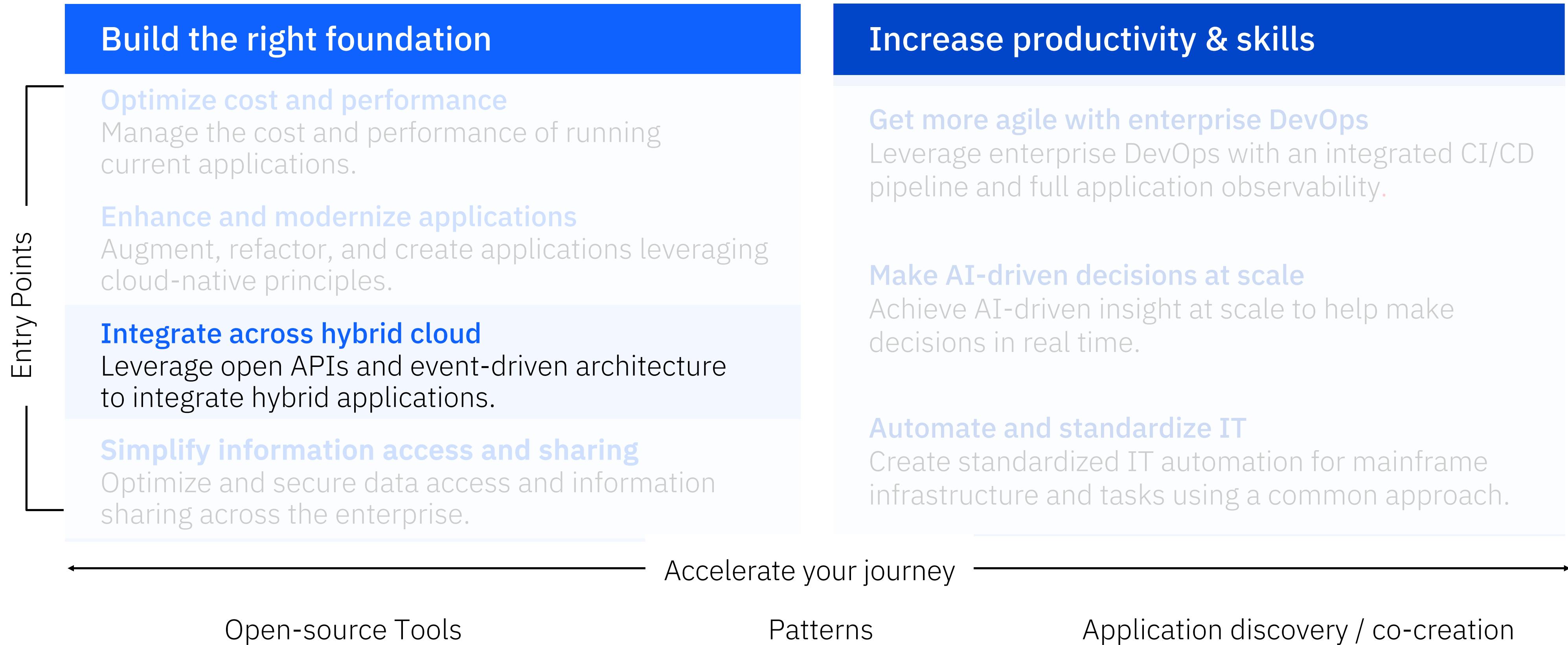
- Isolate the logic of the more important business functions with Service Designer

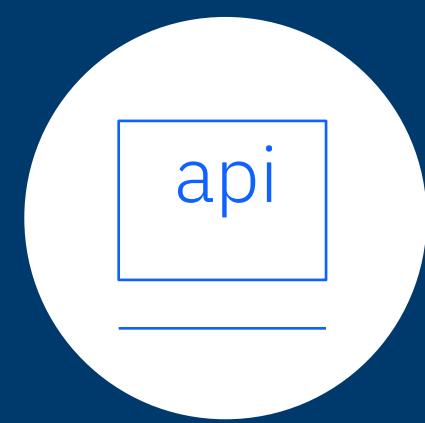
## Benefits:

Reduce cost, address skills issues



# IBM's approach lets you continuously modernize applications & data on IBM Z and Cloud





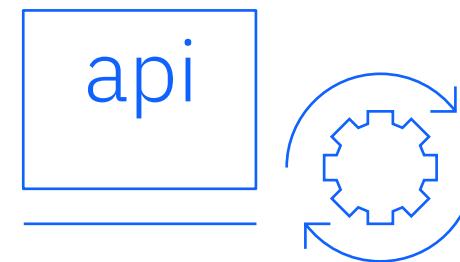
## Integrate across hybrid cloud

Full API lifecycle support  
for z/OS applications



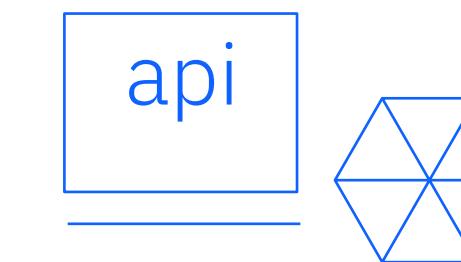
### API Discovery

Quickly discover API candidates in z/OS applications



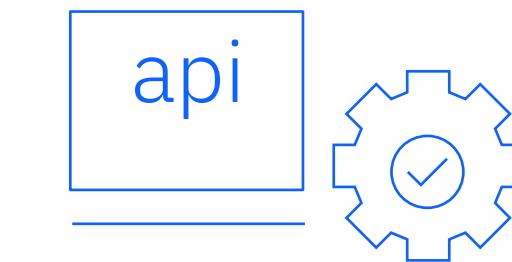
### API Implementation

Create APIs to and from z/OS apps and data



### Application Integration

Integrate those APIs and socialize them with the rest of your enterprise



### API Management

Manage, secure and monetarize APIs

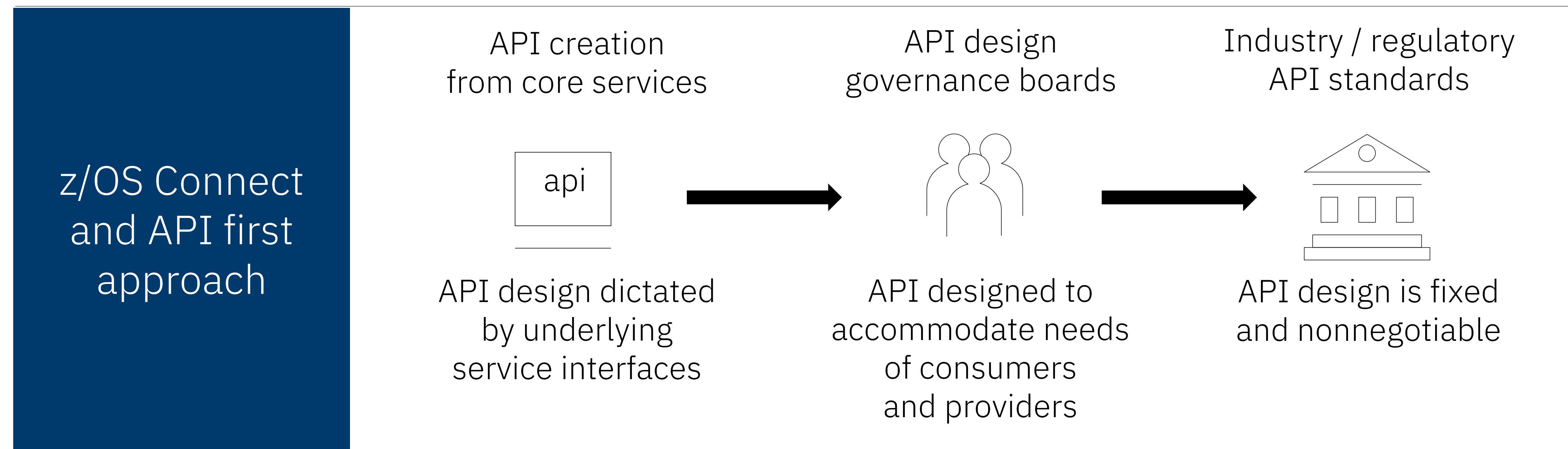
ADDI

Z and Cloud Modernization Stack

IBM Cloud Pak for Integration

# API lifecycle innovation with z/OS Connect

Client requirements have driven the need for “API first” functional mapping capabilities within the integration platform



Our approach now delivers on client needs with Open API 3 with contract first API creation and containerized deployment



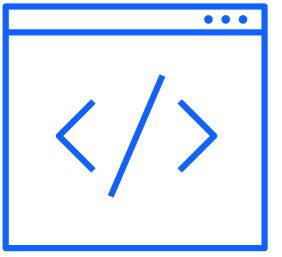
## Integrate across hybrid cloud

### Event-driven architecture

An existing mainframe application can be a producer of events

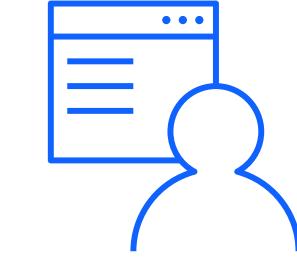
- z/OS Java applications can directly share event data to Kafka
- IBM MQ events can be produced on Kafka

A mainframe application can also act as a consumer of events



### Produce Events

Producing events from traditional and Java applications running on z/OS and placing on Kafka event queue



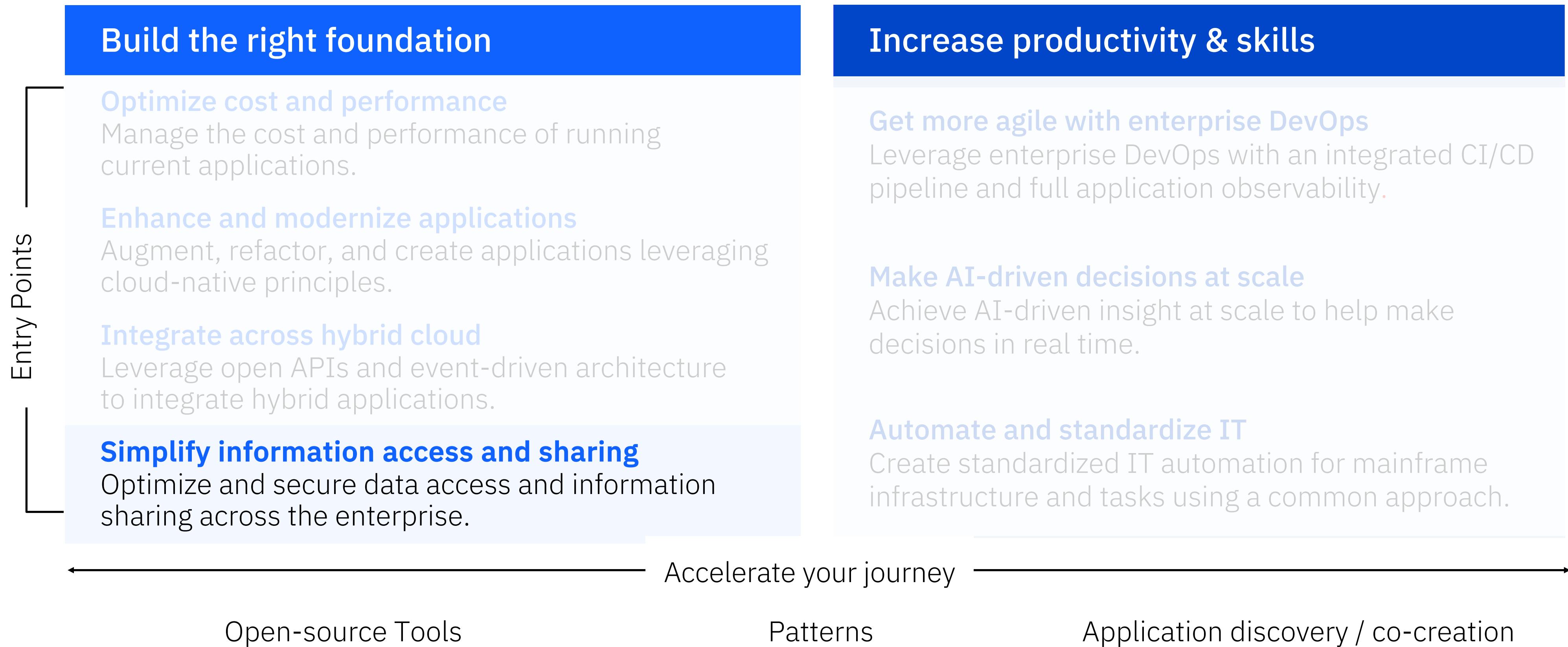
### Consume Events

Consume events from Kafka event queue originating from cloud, distributed, or mainframe applications

**Java SDK, MQ Connector, z/OS Connect, IBM Event Streams or Confluent**

**Java SDK, MQ Connector, z/OS Connect, IBM Event Streams, or Confluent**

# IBM's approach lets you continuously modernize applications & data on IBM zSystems and Cloud





## Simplify information sharing & data access

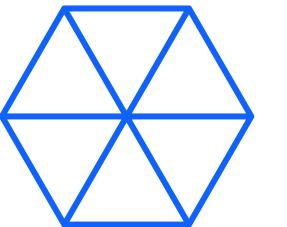
### Build a Data Fabric that includes IBM Z

Integrate directly with Db2 for z/OS

Create real-time information flow between core systems on z/OS and hybrid cloud

Discover and automate data virtualization of non-relational IBM Z data sources

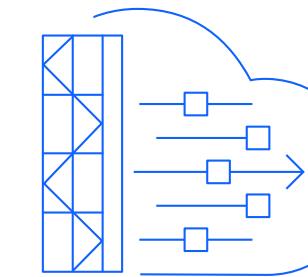
Intelligent integration, unified governance, knowledge insights



### Integrate with Db2

Integrate directly with Db2 for z/OS, optimize resource-intensive processing and insights

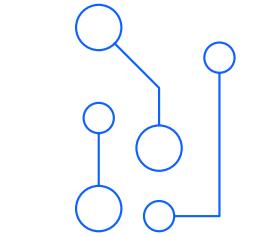
**IBM Db2 for z/OS,  
IBM Db2 Analytics Accelerator**



### Real-time Information at Scale

Create efficient and optimized real-time information flow between z/OS systems of record and hybrid cloud

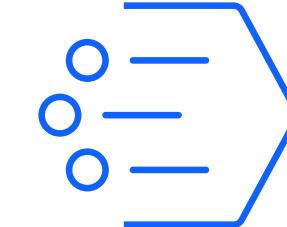
**IBM Z Digital  
Integration Hub**



### Virtualize IBM Z Data

Automate data virtualization of IMS and VSAM data

**IBM Data  
Virtualization  
Manager for z/OS**

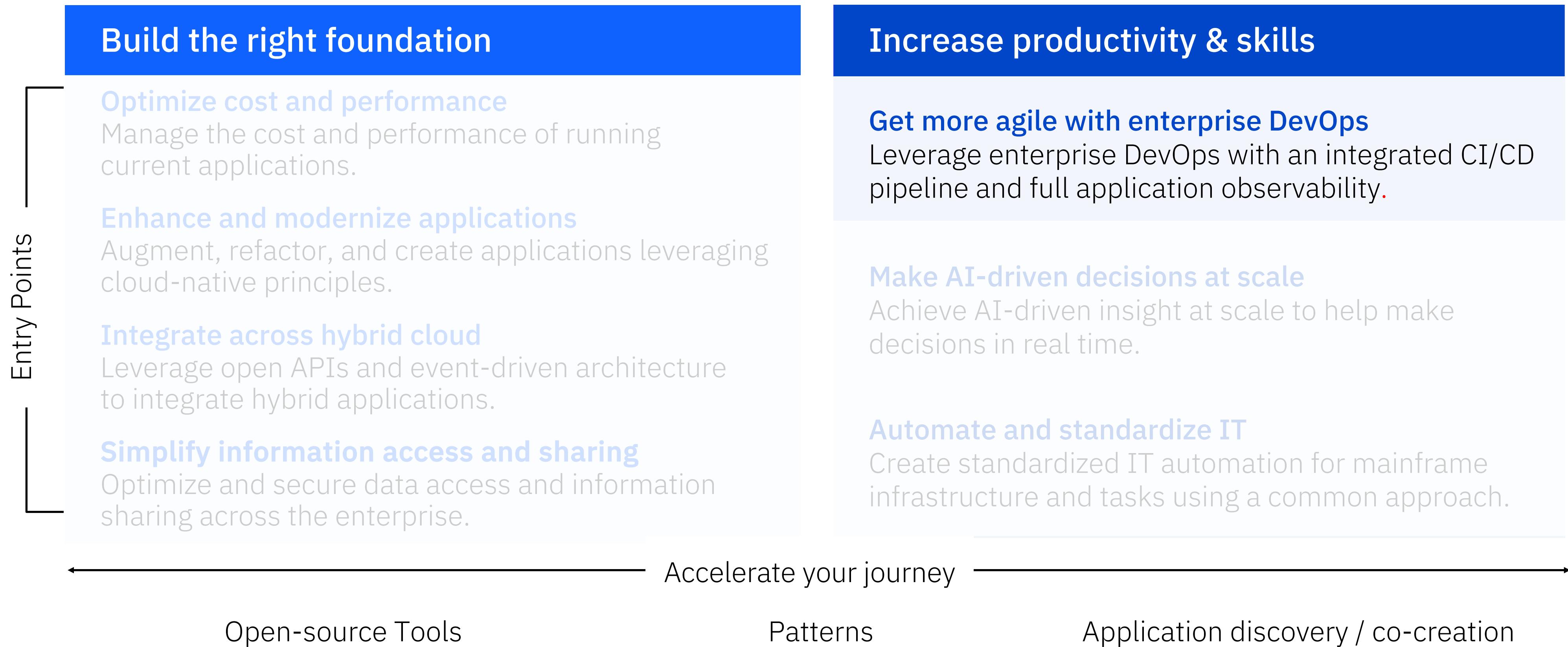


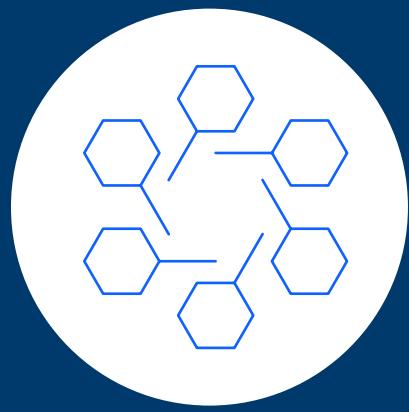
### Data Fabric

Deliver an abstraction layer to share and use data across a hybrid cloud landscape

**IBM Cloud Pak  
for Data**

# IBM's approach lets you continuously modernize applications & data on IBM Z and Cloud





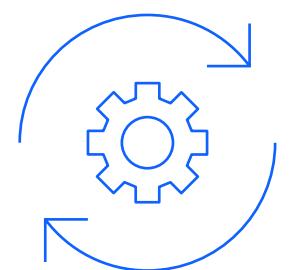
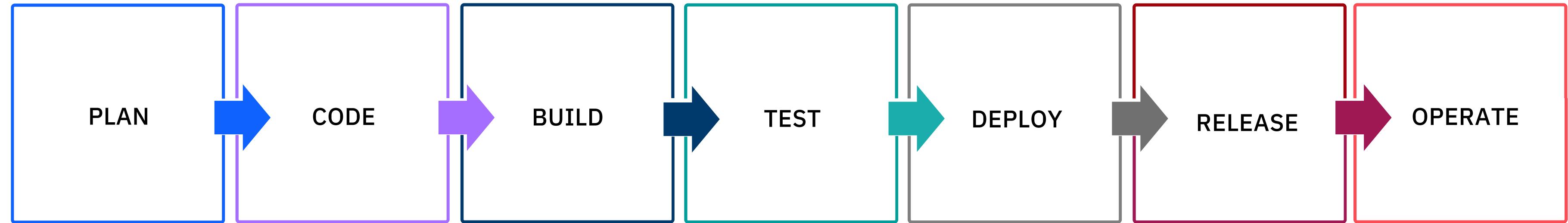
## Building blocks of Enterprise DevOps

Quickly discover data and application dependencies

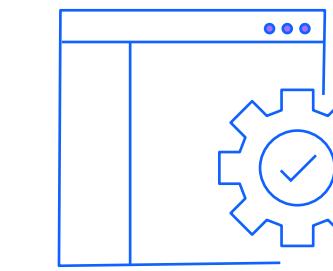
Modernize hybrid cloud applications, leveraging a Git-based workflow

Automate testing lifecycle process to enable an agile CI/CD pipeline

Maintain control of complex releases & supply software faster with automated deployment



Analyze, code, build, edit and debug



Automate testing lifecycle



Control and automate delivery

Continuous Integration

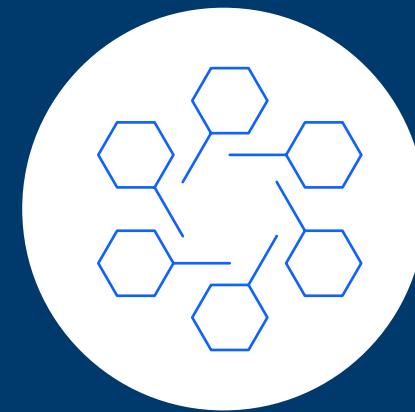
Continuous Testing

Continuous Delivery

Git-based workflow

Application Analysis

- Open-source tools are becoming a de-facto standard – especially Git.
- Complete migration to GIT enables real parallel development and enterprise-wide integration
- Personal z/OS sandboxes provides developers the agility to develop faster



## Get more agile with enterprise DevOps

Quickly discover data and application dependencies

Modernize hybrid cloud applications, leveraging a GIT based workflow

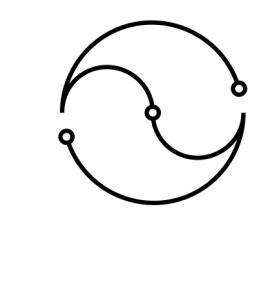
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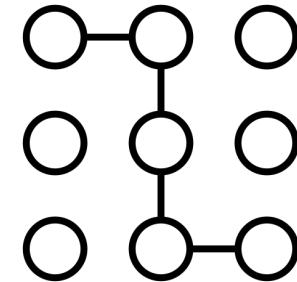
## DevOps for hybrid cloud

	On-Prem	OpenShift (Anywhere)	Public Cloud (IBM Cloud, AWS)
Continuous Integration	Developer for z/OS Enterprise Edition ( <b>IDzEE</b> ) / Application Delivery Foundation ( <b>ADFz</b> )	IBM Z & Cloud Modernization Stack	IBM Z & Cloud Modernization Stack (AWS, Azure) Wazi-aas (IBM Cloud),
Continuous Testing	Z Virtual Dev & Test ( <b>ZVDT</b> ) / Z Dev & Test Environment ( <b>ZD&amp;T</b> ) Virtual Test Platform ( <b>zVTP</b> )	IBM Z & Cloud Modernization Stack	IBM Z & Cloud Modernization Stack (AWS, Azure) Wazi-aas (IBM Cloud)
Continuous Delivery	Urban Code™ Deploy ( <b>UCD</b> ) <b>Wazi Deploy with Ansible</b>	Urban Code Deploy ( <b>UCD</b> ) <b>Wazi Deploy with Ansible</b>	Urban Code Deploy ( <b>UCD</b> ) <b>Wazi Deploy with Ansible</b>
Git-based workflow			
ADDI (Enterprise level discovery across applications)			

# IBM Z AIOps strategy

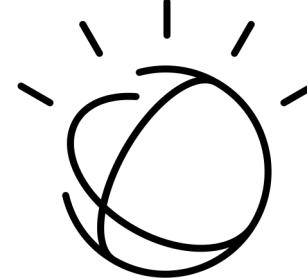


3 pillars to enable IBM Z clients to adopt enterprise observability



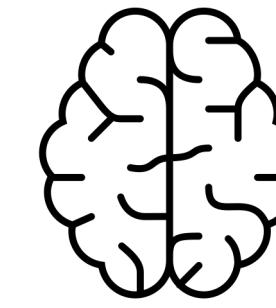
**Cross-portfolio integrations**  
to reduce the time to resolve  
operational issues

Integrated workflows to streamline the  
capabilities across the zAIOps portfolio



**Integrate with IBM Automation**  
to enhance hybrid cloud Observability  
and Proactive Incident Management

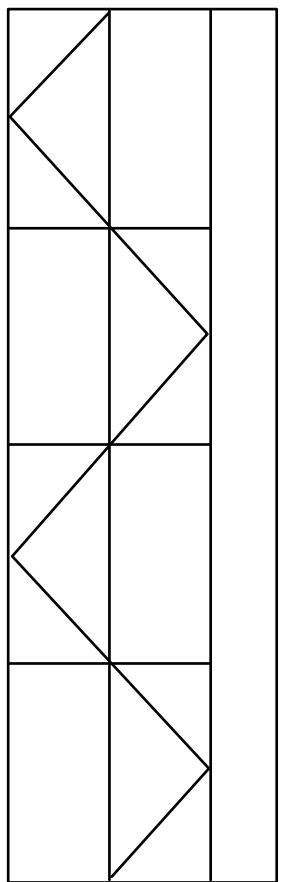
Observe and optimize capabilities across  
IBM Z and hybrid cloud



**Evolve AIOps**  
by embedding analytics and  
AI across the solutions

New AIOps use cases to improve time to  
resolution and address skill gaps

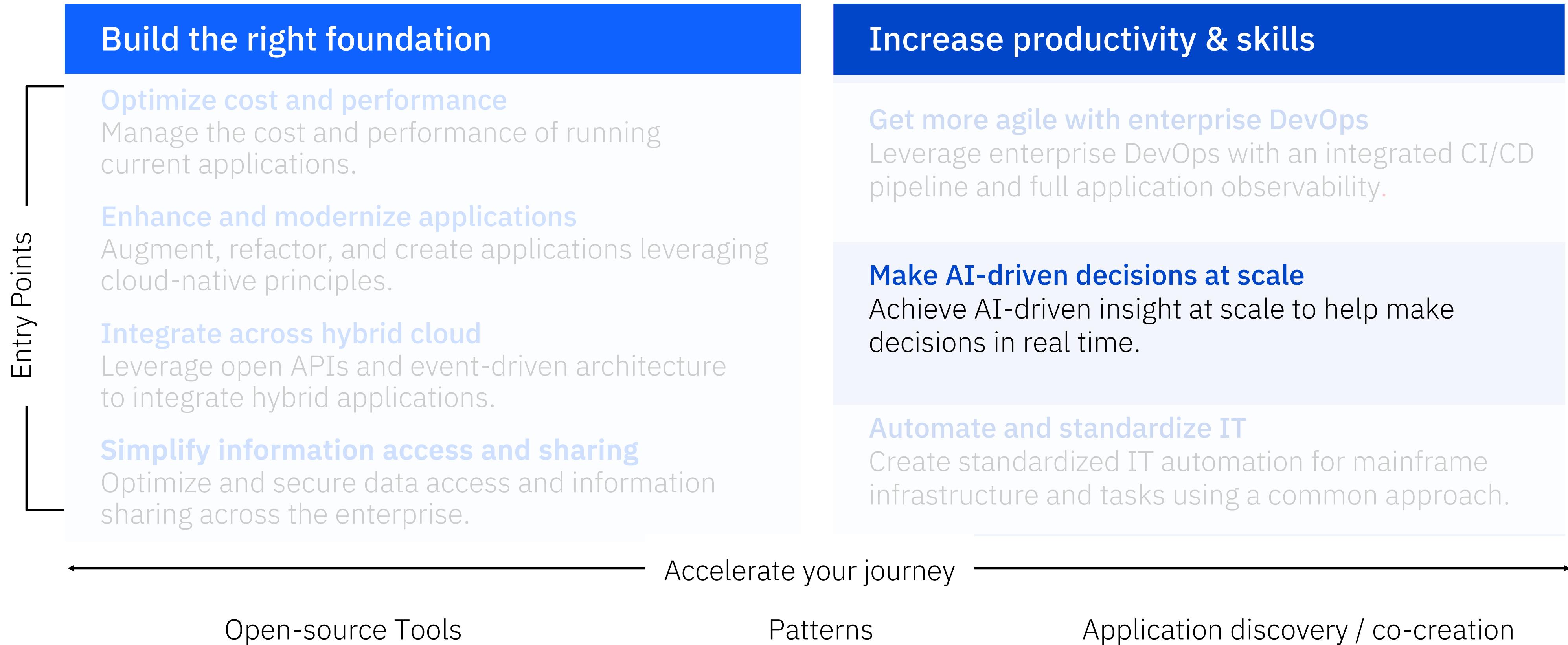
IBM Z

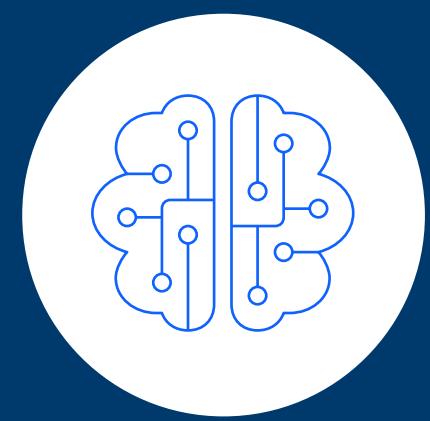


## Observability framework

- **Detect** Proactively identify IT Operations issues
- **Decide** Rapidly perform root cause analysis with AI
- **Act** Collaboratively resolve critical IT issues through automation

# IBM's approach lets you continuously modernize applications & data on IBM Z and Cloud





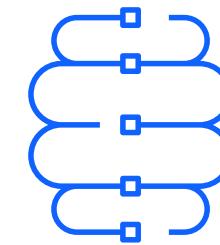
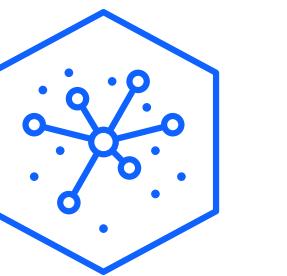
## Make AI-driven decisions at scale

Infuse AI into mission critical applications and maintain SLAs

Leverage open-source AI frameworks and tools to build and train AI models anywhere

Deploy on the environment of choice

Optimized on IBM Z



### Organize Data

Leverage an enterprise data fabric that includes IBM Z data

### Build & Train anywhere

Build and train model in any popular framework on-prem or on Cloud

### Deploy & Optimize on IBM Z

Deploy on IBM Z and seamlessly exploit innovations across the stack to infuse AI in every single transaction

**IBM Cloud Pak for Data**

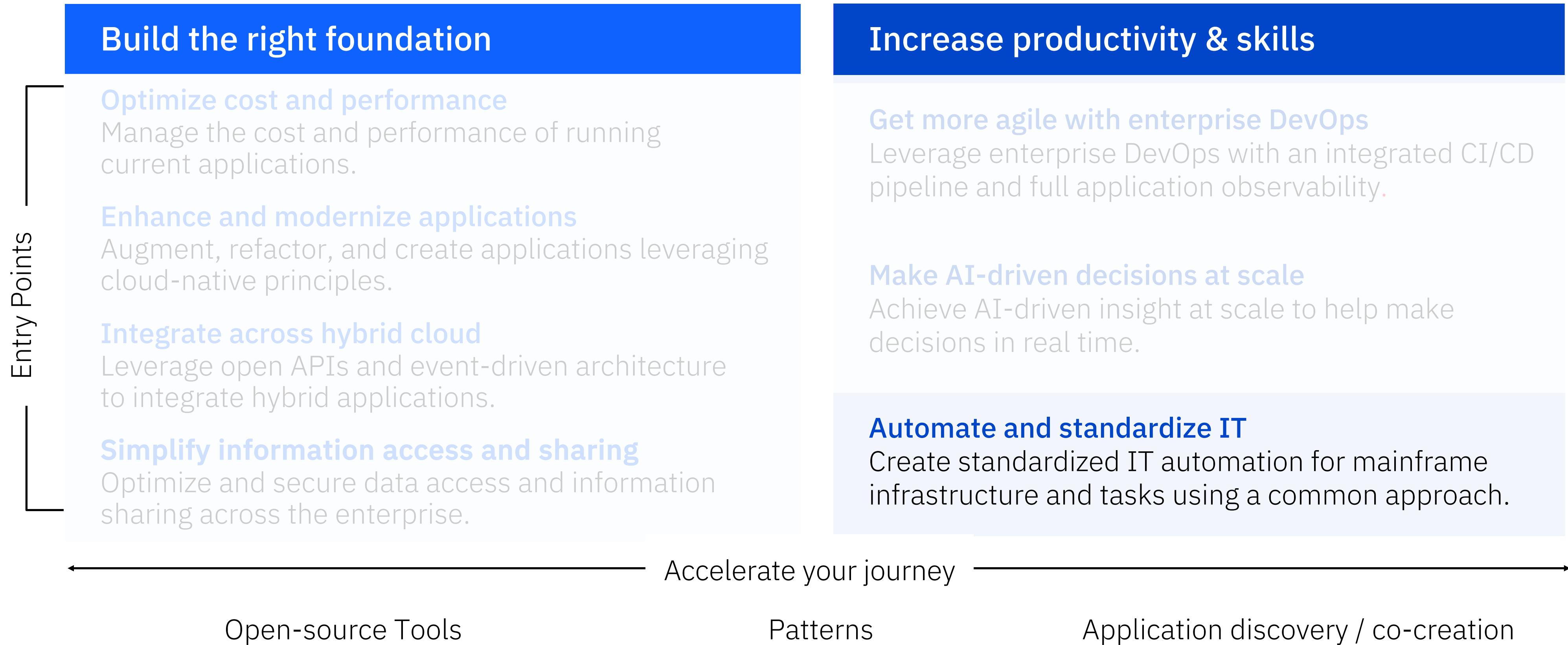
+

**IBM Cloud Pak for Data, Open-source AI frameworks and tools**

+

**Watson Machine Learning for z/OS, ONNX, IBM Deep Learning Compiler, Open-source options**

# IBM's approach lets you continuously modernize applications & data on IBM Z and Cloud



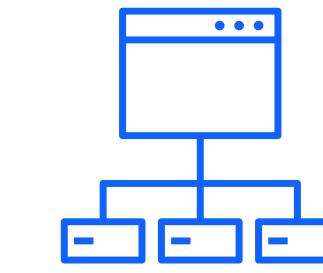
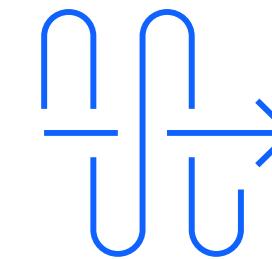
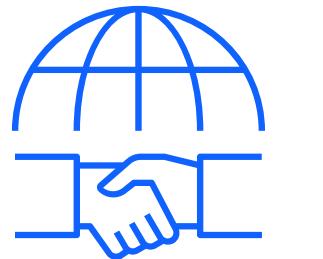


## Automate and standardize IT

Take a standardized approach to automating IBM Z

Empower SREs to automate z/OS tasks without needing mainframe specific skills

Combine with existing IBM Z automation products for an enhanced experience



### Enterprise approach to IT Automation

Consistent, standardized approach to IT automation across hybrid cloud including IBM Z

**Red Hat Ansible Automation Platform**

### Automate Z Tasks with Ansible

Leverage Red Hat Ansible to automate select Z tasks with collections tailored for z/OS

**Red Hat Ansible Certified Content for IBM Z**

### Leverage existing automation products

Extend existing Z automation offerings by combining and orchestrating their operations with Ansible

**Red Hat Ansible + IBM Z System Automation and more**

# Red Hat + IBM Research partnered to bring AI to Ansible

## IBM watsonx Code Assistant for Red Hat Ansible Lightspeed

Infuse Ansible with AI. Our goals:

- To bring the **power of AI to the Ansible** code experience.
- To help **address the growing IT automation skills gap** by making Ansible more accessible to a wider swath of IT professionals.
- To **help experienced Ansible creators** be more productive, efficient, and error-free.



Dr. Ruchir Puri, IBM Research, AnsibleFest 2022 keynote

# How are IBM Z clients currently using Open Enterprise Languages for application modernization?



## An Independent Software Vendor

Phoenix Software used Node.js to automate the delivery of a legacy software licensing system.



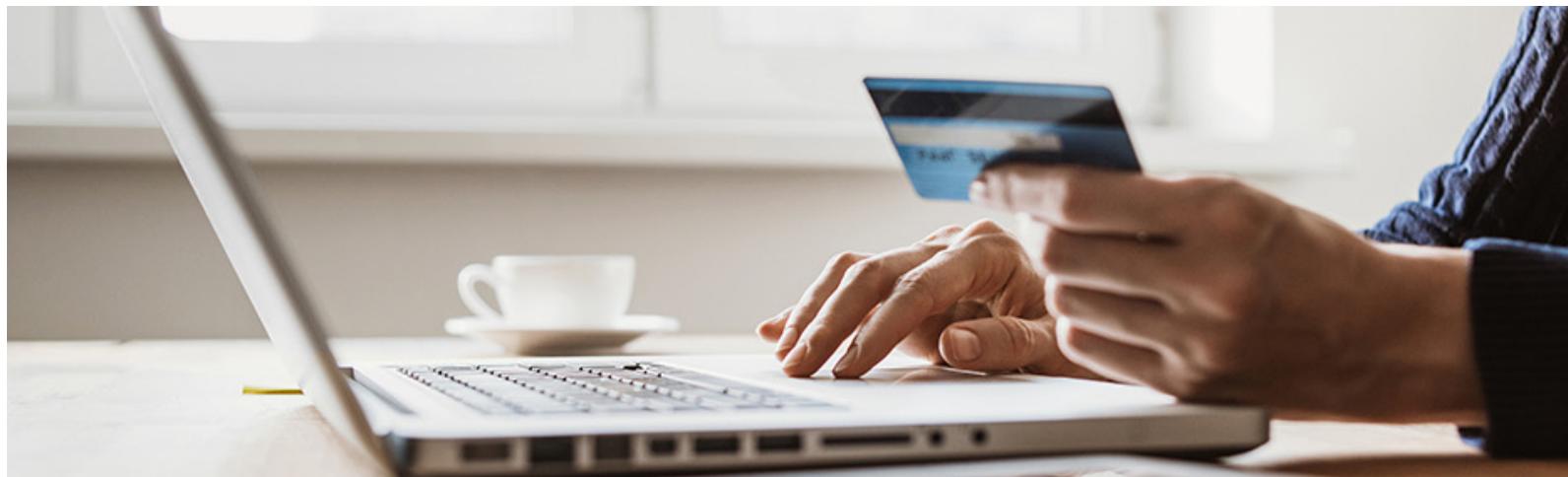
## A major Canadian bank

Used Node.js to securely aggregate data on z/OS and efficiently develop a banking dashboard.



## A major European bank

Used Python's data manipulation & reporting tools to implement APIs for report generation.



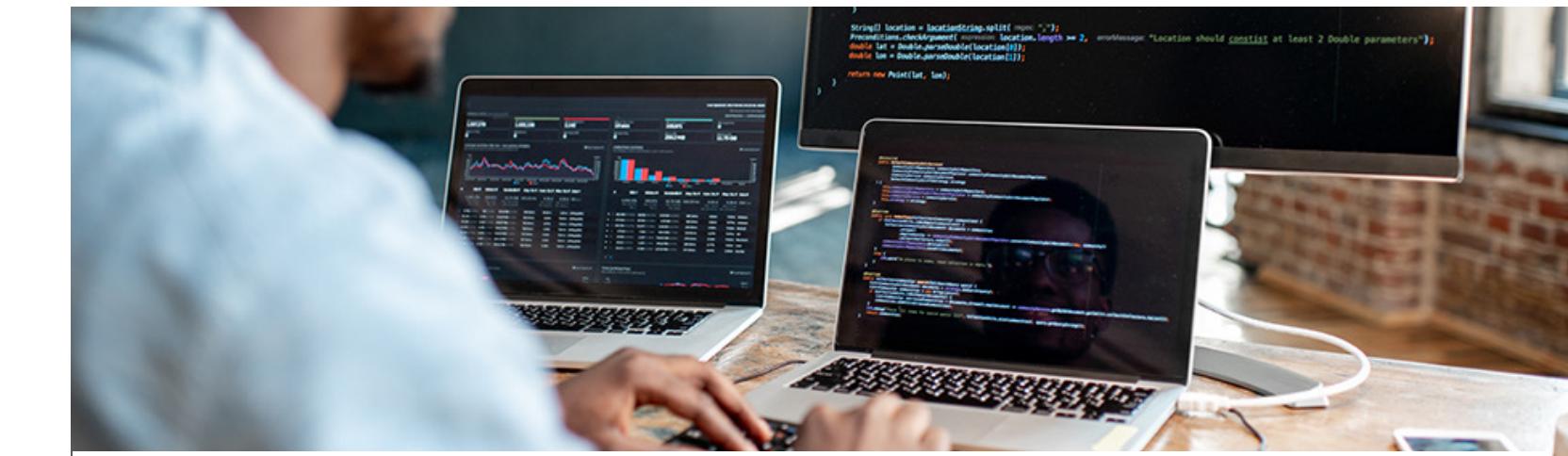
## A major American bank

Used Python to combine ISV data from a RESTful API with Z data to generate new insights without moving the data off the platform.



## An Independent Software Vendor

Ported to z/OS a very popular Go analytics and interactive visualization web application.



## An enterprise software company

Used Go to invoke z/OS native code and services while leveraging readily available Go libraries to perform secure crypto algorithms.

# Key References:

IBM Z and LinuxONE Sessions



IBM Z and Cloud Modernization Stack



Application Modernization Redbook



# Highly recommend you go here to see/learn more



## Sandbox

IBM Z and LinuxONE Tech Zone #12  
Zone 560, Plexi and Lego!

# Call for Code®

Join the world's largest tech-for-good initiative!

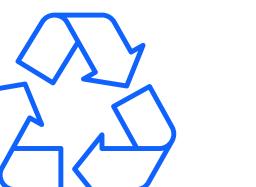
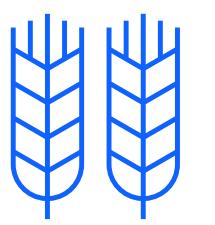
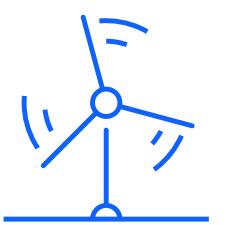
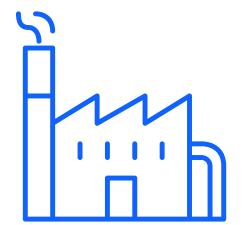
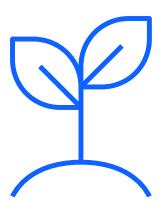
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