Bringing generative AI to z/OS Application Modernization with *IBM watsonx Code Assistant for Z* Wildfire Workshop

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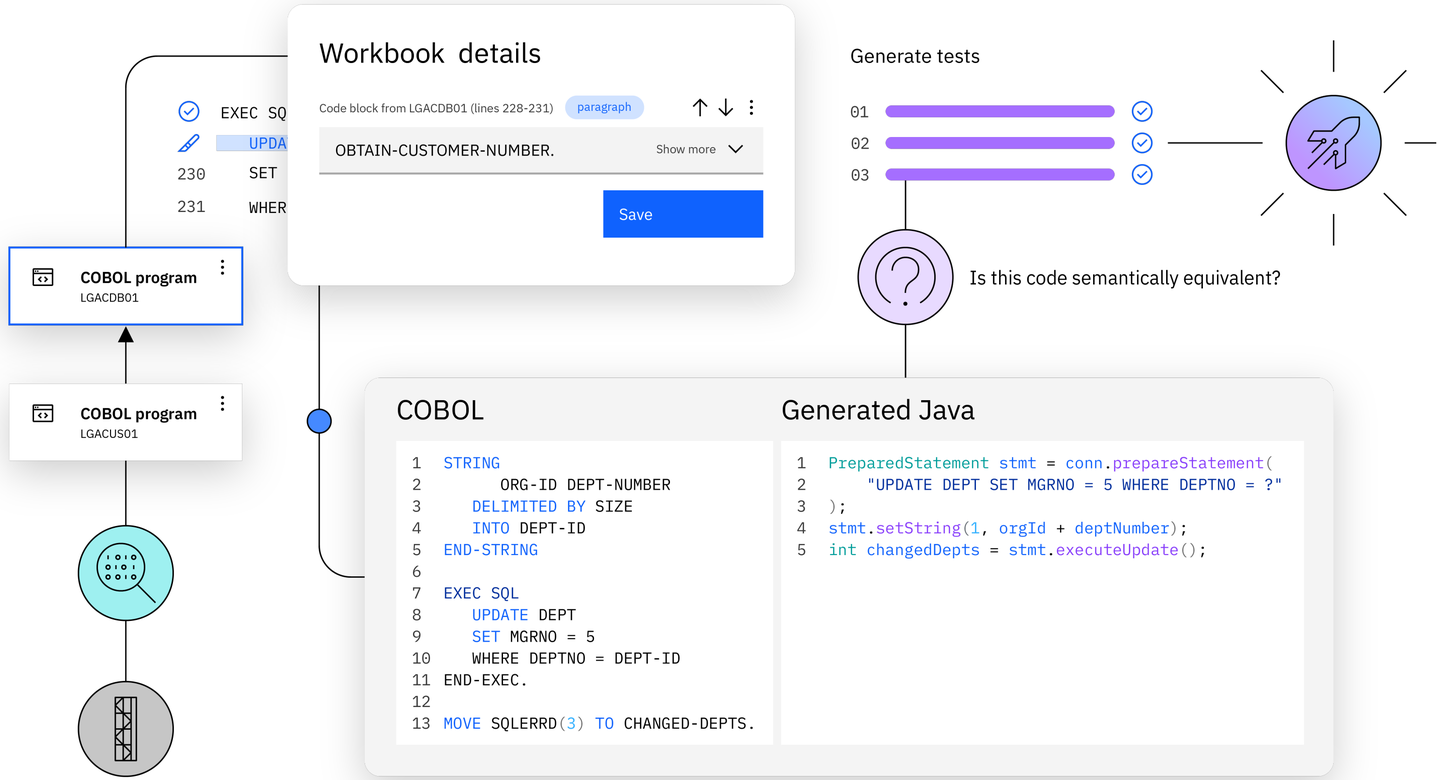


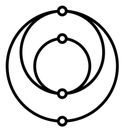
One principal challenge in organizations today is accelerating mainframe application modernization

230+ billion

lines of COBOL are estimated to be actively running by enterprises[1]

1. Source: Reuters Survey (2020)

Mainframe application modernization challenges

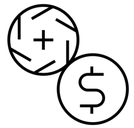


Agility

With enterprise DevOps, go from code releases quarterly (per calendar year) to quarterly (per hour)

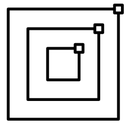
Skills

Reduce the talent gap with common tools and operating models across platforms



Costs

Leveraging consumption-based pricing on the mainframe (Tailored-fit-pricing) to add new apps to the mainframe



How

What are the proven patterns and best practices for modernizing mainframe applications?

Generative AI helps address modernization challenges

30%

Reduction in time to complete coding tasks through the combination of human & AI assistants working in tandem by 2028

80%

Of the product development lifecycle will make use of generative AI code generation by 2025

Source: Gartner, Emerging Tech: Generative AI Code Assistants Are Becoming Essential to Developer Experience, ID G00790320, May 2023

IBM is accelerating application modernization with generative AI

Build the right foundation

Optimize existing applications
Manage the efficiency, cost, and performance of running current applications.

IBM watsonx Code Assistant for Z

Enhance and extend applications
Understand, refactor, and transform applications leveraging an AI-assisted cloud-native experience

Integrate across hybrid cloud
Leverage open APIs and event-driven architecture to integrate hybrid applications.

Simplify information sharing and data access
Optimize and secure data access and information sharing across the enterprise.

Increase business agility

Adopt enterprise DevOps and observability
Leverage enterprise DevOps with an integrated CI/CD pipeline and full application observability.

Make AI-driven decisions at scale
Achieve AI-driven insight at scale to help make decisions in real time.

Automate and standardize IT
Standardized (AI-assisted) enterprise capabilities to automate and manage the application and IT life cycle

IBM watsonx Code Assistant for Red Hat Ansible Lightspeed

Accelerate your journey

Application Discovery / co-creation

Patterns

OpenTools & Languages

IBM watsonx Code Assistant

Built for targeted use cases

Future

AI-assisted Ansible content generation

IBM watsonx Code Assistant for Red Hat Ansible Lightspeed

AI-assisted mainframe application modernization

IBM watsonx Code Assistant for Z

IBM watsonx Code Assistant for ...

...

IBM watsonx Code Assistant
Gen AI for Code

Ansible-tuned Model

Cobol to Java-tuned Model

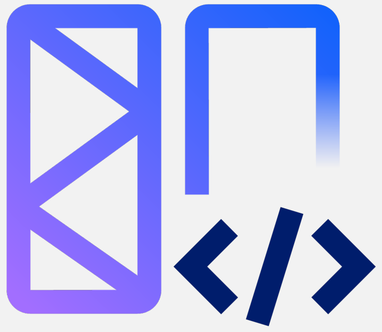
<language>-tuned Model

...

IBM watsonx.ai Granite code models

IBM watsonx Code Assistant for Z

AI-assisted mainframe application modernization



Accelerated application lifecycle

New automated and AI-assisted capabilities to support end-to-end application modernization lifecycle with auto discovery, refactor, and test.

Fine-tuned generative AI for mainframe code

Leverage the power of generative AI to make it easier for developers to explain applications and selectively transform them into well architected, high-quality Java code.

Incremental approach provides faster value

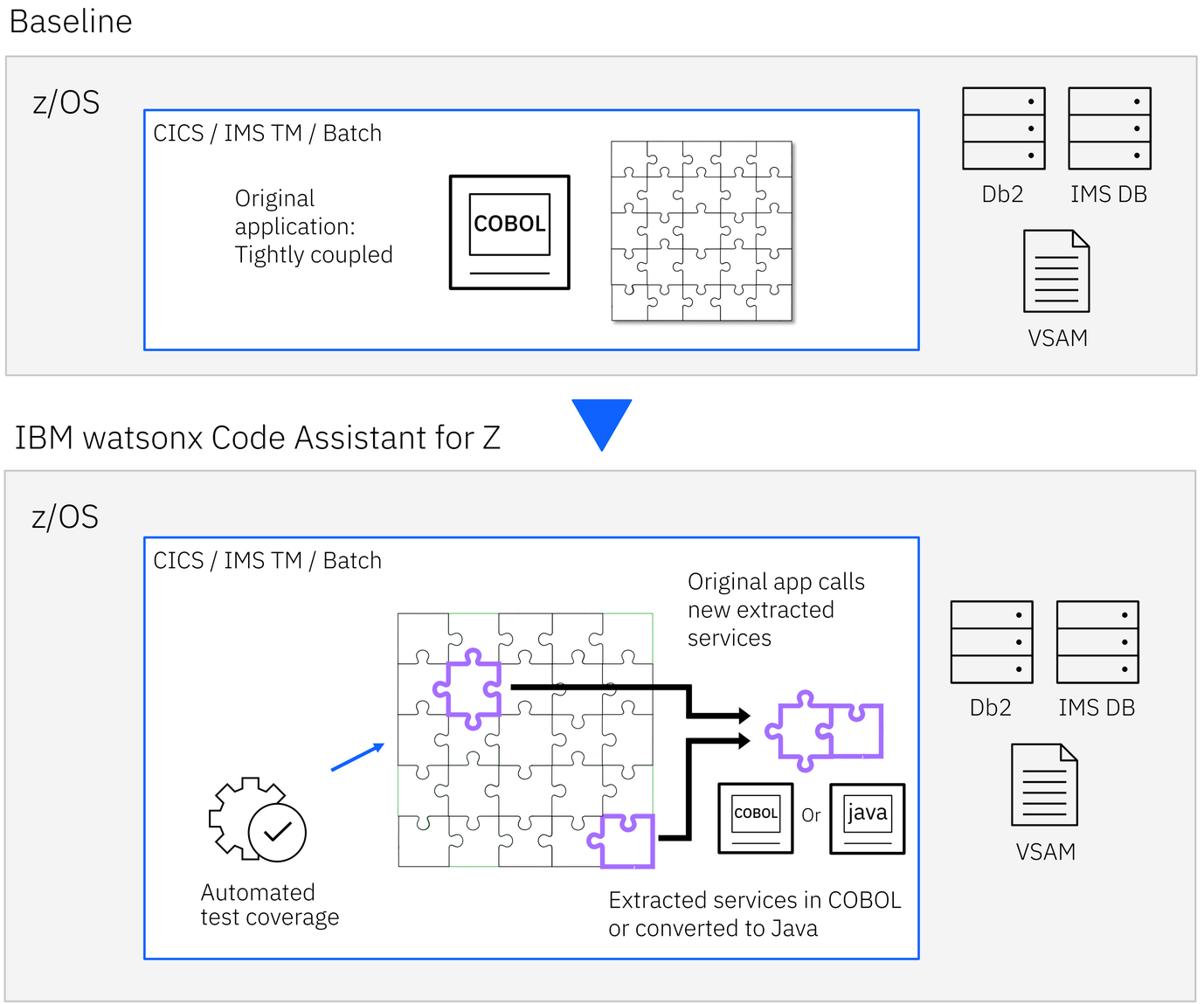
Modernize using an incremental approach that is faster, lower cost and less risk and supports full mixed language interoperability.

Incremental approach provides faster value

Objectives:

- Minimize risk with an incremental approach to modernization
- Selectively modernize based on technical advantages and business needs
- Maintain flexibility to leverage mixed language and architecture with complete interoperability

Transformation with a best-fit approach

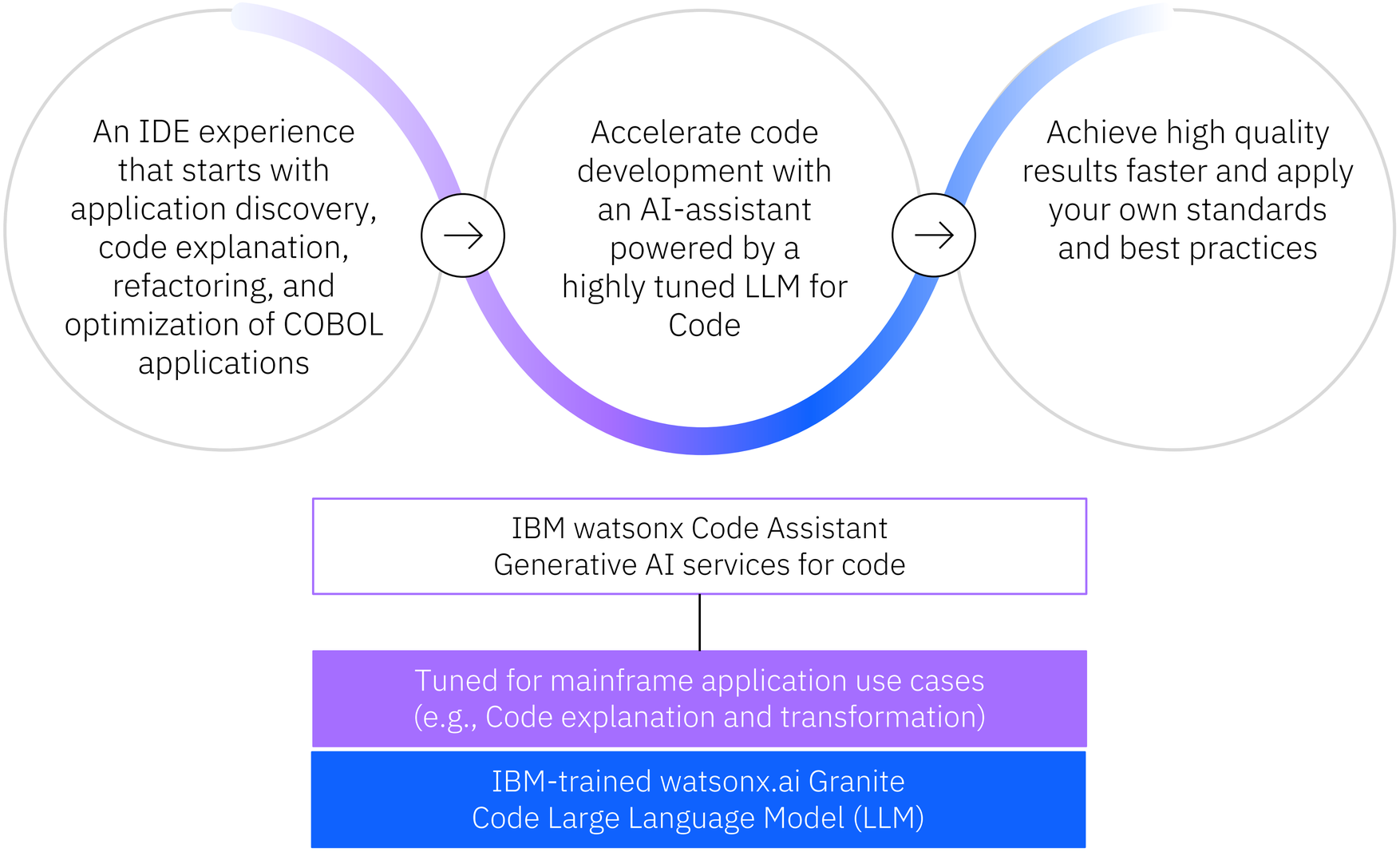


Fine-tuned generative AI for mainframe code

Objectives:

- Finely-tuned model improves understanding, accuracy, and code quality
- Well-architected AI-generated code
- Easy to maintain code that can be enhanced with your standards and best practices

Leverage the power of generative AI to make it easier for developers to modernize code with AI-generated recommendations



COBOL Modernization use case

	Understand your application	Code explanation	Code refactoring	Code optimization*
Steps	Deep analysis to capture and document program understanding and relationship. Creating an application “blueprint”	Leverage Gen AI to explain code in natural language that can be inserted as comments or downloaded for documentation	Gain agility by decomposing (refactoring) your application into more modular business services	Improve COBOL code by obtaining insights and recommendations for performance improvement
Outcomes	• 2-5X productivity gain in code isolation • 80% less time for application understanding	• Improved developer onboarding time	• 66% reduced effort for understanding and refactoring	• Improve COBOL performance by up to 30%

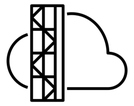
* Available starting 3Q24

COBOL to Java Transformation use case

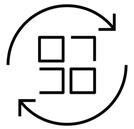
	Understand your application	Code explanation	Code refactoring	Transform COBOL to Java	Validate Java
Steps	Deep analysis to capture and document program understanding and relationship. Creating an application “blueprint”	Leverage Gen AI to explain code in natural language that can be inserted as comments or downloaded for documentation	Gain agility by decomposing (refactoring) your application into more modular business services	Leverage Gen AI to transform the refactored and optimized COBOL code into object-oriented Java code	Ensure semantic equivalence between refactored COBOL code and transformed Java code. Assist Java developer with leave behind test asset
Outcomes	• 2-5X productivity gain in code isolation • 80% less time for application understanding	• Improved developer onboarding time	• 66% reduced effort for understanding and refactoring	• Best fit language – Bring the tooling and ecosystem benefits of enterprise Java • Expand mainframe developer talent pool	• Accelerate unit testing • Increase code quality

Business Value Drivers

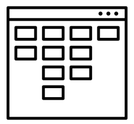
Enhance developer productivity



Increase business agility



Increase operational efficiency



Lower risk

Large European Bank

2-5x Productivity Gain in Code Isolation

Financial Company

66% reduced effort for understanding and refactoring

Westfield Insurance

2-2.5x developer productivity gain

- 80% less time for application understanding
- reduced change management and onboarding costs

Read the Case Study

Global Logistics Company

14-47% reduced effort for understanding & refactoring

60% reduced effort Code Transformation

Accelerated application lifecycle

Objectives:

- Address skills and productivity challenges with automation and AI
- Ensure IBM Z qualities of service with mixed language interoperability
- Align with industry standard DevOps approaches

IBM watsonx Code Assistant for Z modernization experience

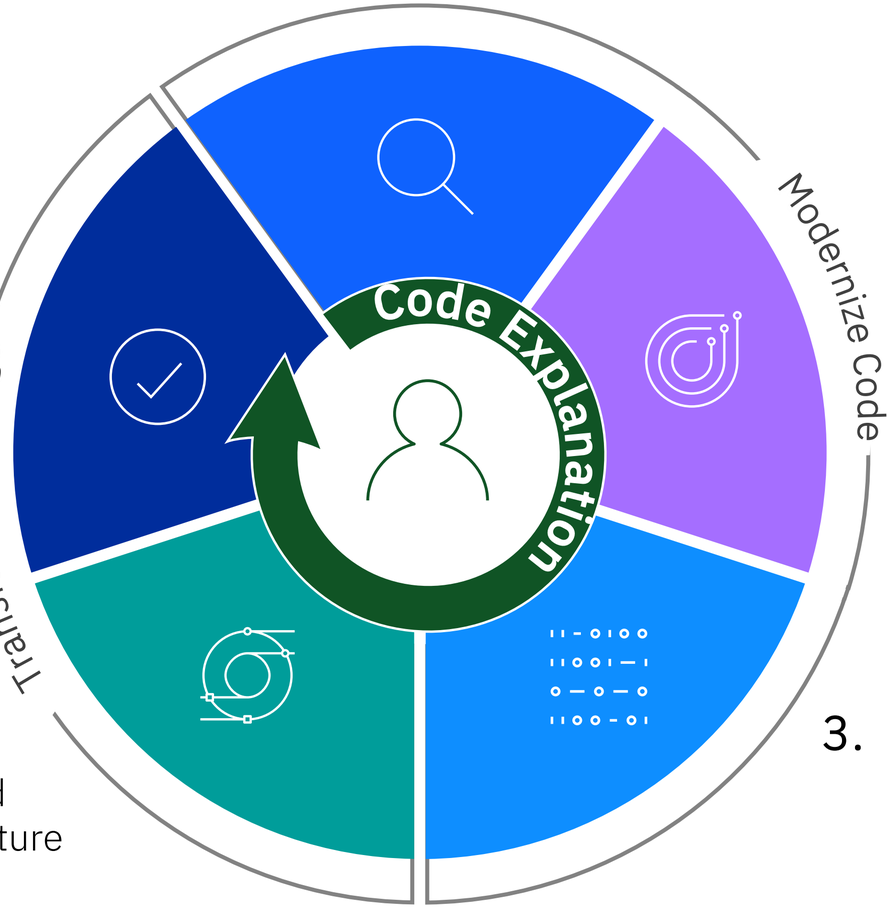
1. **Understand**
   application landscape with auto-discovery

2. **Refactor**
   to modular business services

3. **Optimize**
   code to increase performance

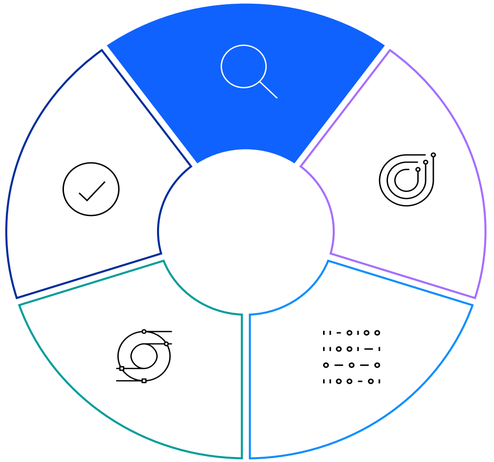
4. **Transform**
   code with optimized design and architecture

5. **Validate**
   outcome with auto-generated tests



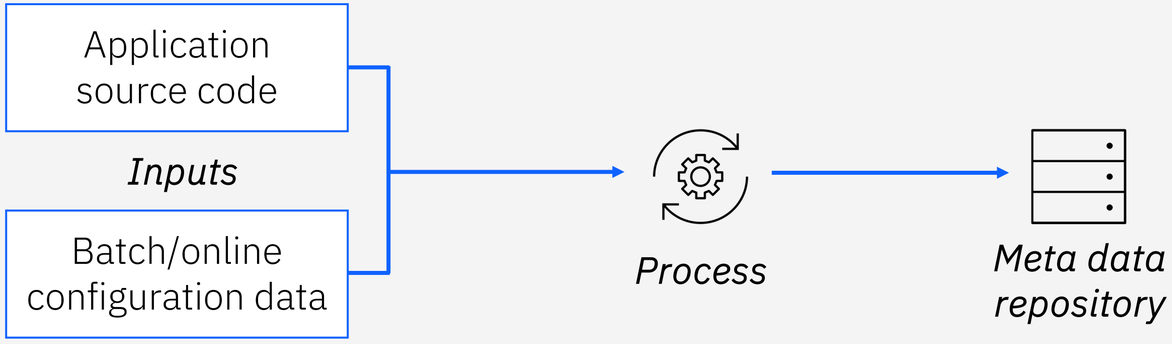
Tailor your journey based on your application modernization and development needs

Understand: Begin continuous modernization of your tightly coupled applications



Visualize and auto-document your COBOL application at the enterprise level

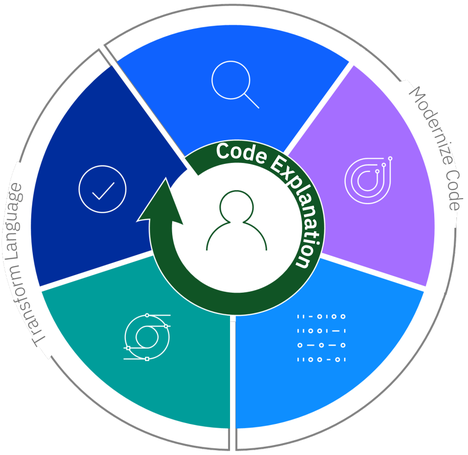
- Start of your application modernization journey with an inventory of applications, resource usage, and dependencies. Leverage COBOL explanation to improve understanding
- Build business alignment and confirm that your understanding of the application is valid – ensuring modernization efforts achieve expectations
- Mitigate the challenge of lack of application SMEs with automated analysis & visualized application flows to enable accelerated application understanding



Application Discovery is the starting point for z/OS application modernization

- Deep enterprise application analysis
- Auto discovery of data and program relationships
- Enable incremental refactoring of business services

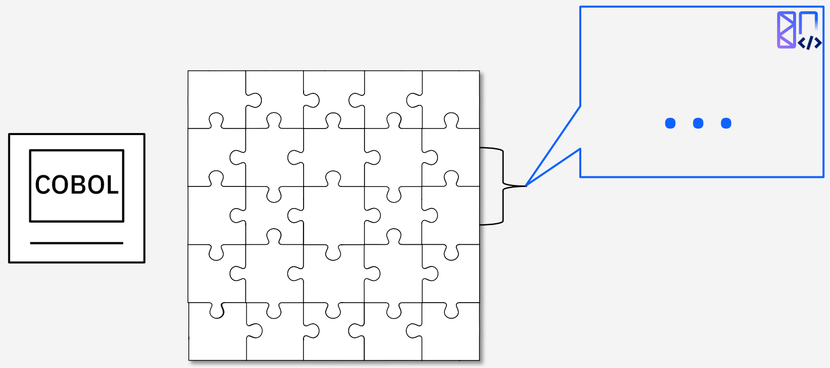
Code explanation: Understand and document your application faster



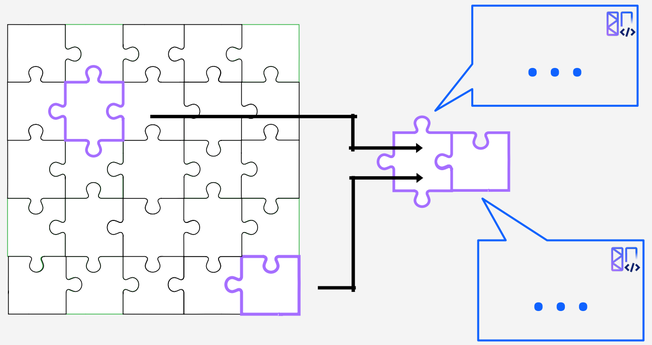
Leverage Generative AI for a natural language explanation of your COBOL code

- **Narrow the knowledge gap**: Real-time COBOL code explanations aid developers, accelerating development or modernization efforts
- **Free up SMEs:** Less reliance on senior experts frees them for advanced work, reducing knowledge bottlenecks via real-time code explanations
- **Streamline documentation**: Utilize code explanations to update application knowledge, reducing manual efforts
- **Facilitate modernization strategy**: Architects gain deeper insights into COBOL programs, aiding in identifying optimal modernization approaches

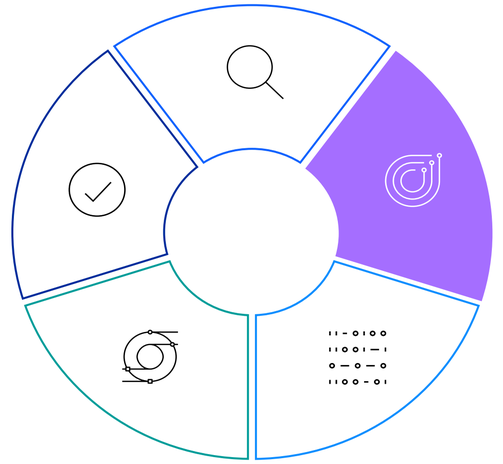
Monolithic application



Mainframe Application with Business Services



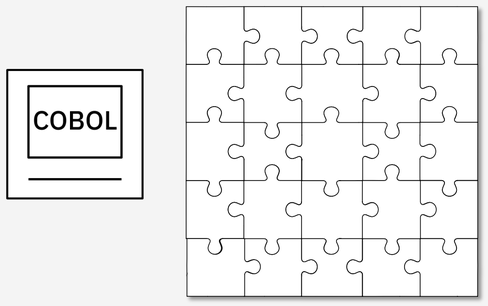
Refactor: Automated tooling to identify services within an application to modernize



Discover programs and data needed for a refactored business service within a large application

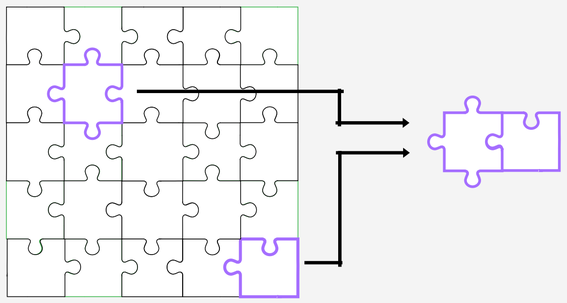
- Separate code needed into a refactored service which will be easier to maintain and reuse
- Automate the service creation process to improve accuracy and reduce time and skill required for manual developer analysis
- Unlock modernization development agility and ease of integration

Monolithic application

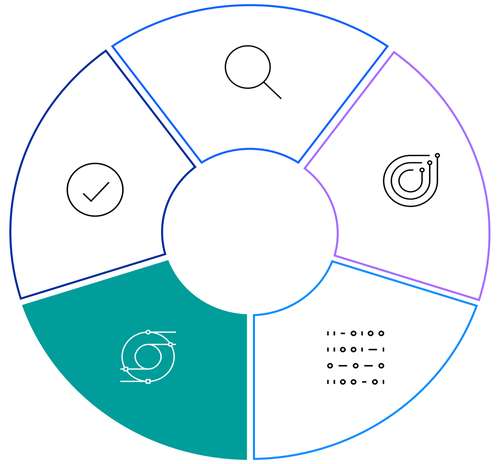


New automated refactoring capability

New Refactoring Assistant can quickly identify parts of an application to refactor and extract into modular, reusable services via deep functional analysis of the source code.



Transform: Leverage generative AI to accelerate COBOL to Java conversion

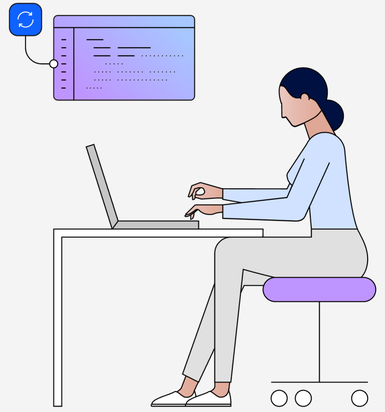


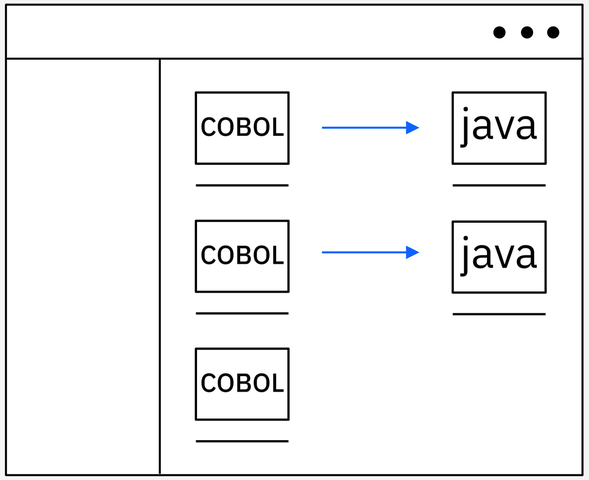
AI assistant to generate Java code in minutes, not months

- Generative AI to build data structures and business logic in Java from your refactored COBOL code
- Well-architected object-oriented Java – not JOBOL
- Maintains IBM Z runtimes and qualities of services with interoperability, integration, and enterprise standardization

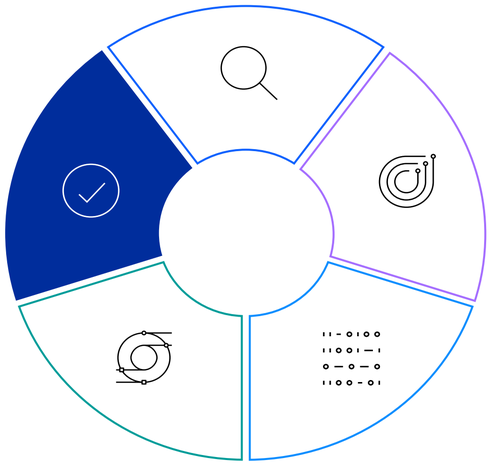
IBM watsonx Code Assistant for Z

- State of the art granite.20b.code large language model with a 32k token context window
- Trained with 1.6T tokens across 115 programming languages
- Tuned for Cobol to Java use case





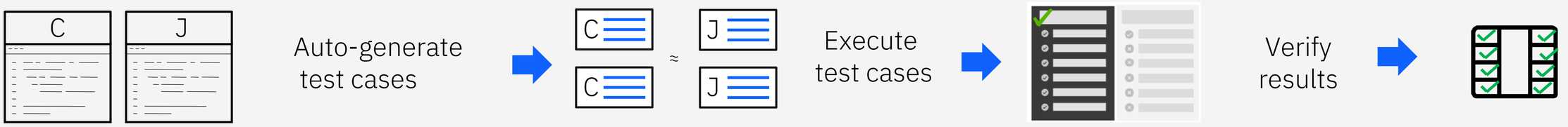
Validate: Automated testing capability



Streamlined and accelerate testing of new code

- Auto generated testing to compare semantic equivalence of new Java service to, providing confidence in a successful Java translation and de-risking the process
- Accelerate developer productivity
  - Enables incremental testing if the Java code is working vs waiting to test broader code path flows in a later test cycle where it's harder to determine errors
  - Tool automation automating tests and enabling them to run in isolation without requiring the middleware to execute the test
  - Junit tests generated can be reused and integrated in the DevOps pipeline per standard practice as the application evolves

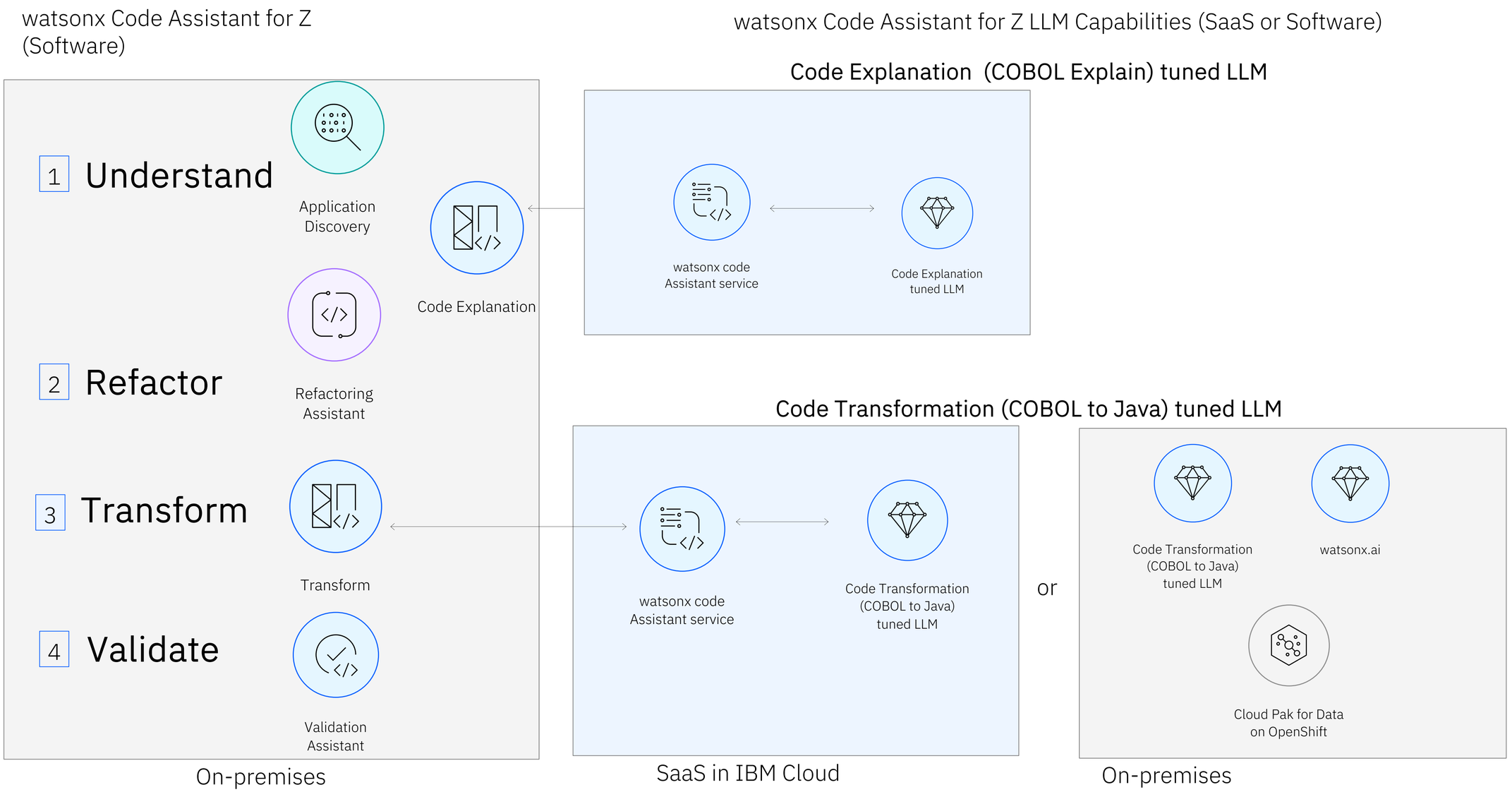
Validation Scenario: Tests compare COBOL paragraph and Java method verify equivalence



Uses AI to generate the tests using the same input/output data for both the COBOL and Java tests

Automatic mocking enables unit tests to run on z/OS in isolation without middleware!

IBM watsonx Code Assistant for Z deployment model with SaaS and on-premises LLM options



Vision and roadmap

Vision:

Code generation

Generate an object-oriented Java equivalent service from an enterprise COBOL service

Code validation

Generate test cases to validate a new service & surrounding application

Code explanation

Explain what a COBOL or Java application is doing – and its impact

Code optimization

Review a COBOL or Java service and help make it better

Roadmap:

2024

Planned Highlights

- Code optimization
- PL/I support
- Model customization & tuning
- Ongoing z/OS subsystem support

Next steps

Show me → Initial Project → Scale Delivery

Briefing & demos

- Overview
- Demo
- Next steps

1 Hour

Solution workshop(s)

- Use case alignment
- Pilot scope
- Define success criteria

2-8 Hours

Velocity pilot

- Deliver pilot scope
- Prove the value
- Knowledge transfer

2-4 weeks

Delivery

- Accelerate and scale
- IBM expertise
- Solution delivery

Get ready to accelerate your application modernization journey

Learn more :

- Read the Accelerate Mainframe Application Modernization with Hybrid Cloud (IBM Redpaper)
- Visit the watsonx Code Assistant for Z webpage
- Request a briefing and demo
- Learn more about IBM Consulting

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