Amdocs (Astadia) Mainframe Modernization

Amdocs End-to-End Application Modernization Best Practices



July 18, 2025

Agenda

- 1. Introductions
- 2. Intent Discovery
- 3. Amdocs (Astadia) Overview
- 4. Assessment Overview
- 5. Modernization Options
- 6. NextGen Rearchitecture
- 7. End-to-end Services
- 8. Success Stories
- 9. Next Steps







~30,000 Employees



Our solutions impact more than

3 billion
people around the world

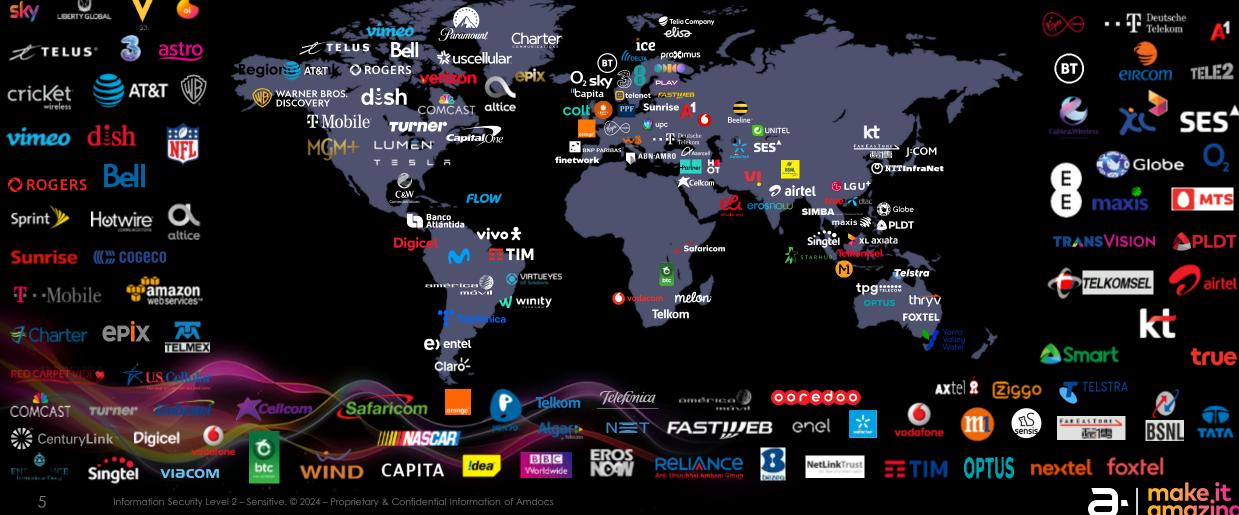
~90
Countries

400Customers globally

GenAl led organization

\$5B FY24 Revenues, Up 2.7% YoY

Global Customer Footprint



I:COM

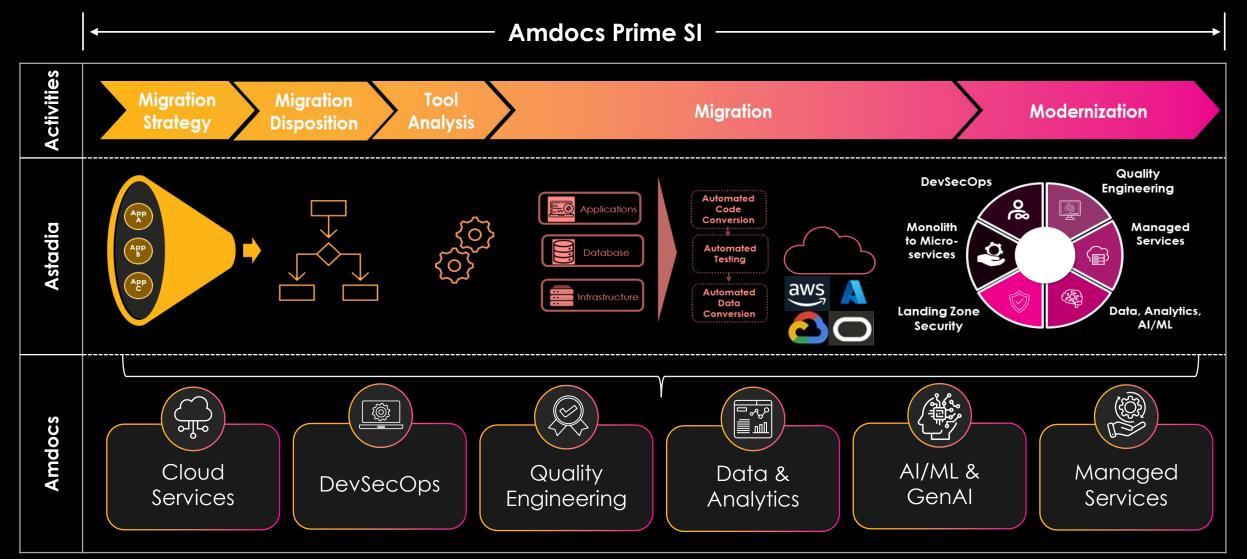
Mainframe Modernization

The Amdocs proposition

Using Agile methods, DevOps, automated conversion and testing, and cross-studio engagement as a foundation for fast, efficient, reliable, end-to-end application modernization



Amdocs delivers end-to-end modernization program execution





Market Leading Mainframe Modernization Vendor

ISG 2025 report names Astadia as a market leader

Best Banking Infrastructure Platform- 2025 **Fin Tech Award**

300+

Successful Projects

95% Mainframe Projects

26+yrs

Average consultant experience

97% Success Rate

Some of our clients















































































Assessment Definition

Definition:

Assessments identify and analyze the current state legacy requirements and issues of an application portfolio and its execution environment, and determine the appropriate patterns, methods, costs, and timelines for modernization, deployment, support and ongoing management in a target environment.

Result:

Assessments provide a roadmap to accomplish modernization goals and resolve legacy issues.

Benefits include:

- Fixed price and duration
- Focused workshops
- Current state findings
- Disposition analysis (Optional, as needed, in parallel)
- Target state recommendations
- Modernization project pricing



Modernization Assessment & Discovery

Framework



Technical assessment

- Code and data access pattern analysis
- Platform utility & 3rd party product mapping
- Environment workshops



Business discovery

- Operational workshops
- Disposition analysis (optional)
- Vendor mapping



Assessment Timeline



Typical duration: 8-12 weeks (from Phase 1, dependent on portfolio size, technologies, tooling, and dispositioning requirements)

Phase 0 – Prerequisites, Onboard, Plan: Typically, ~1 month prior to project (client dependency)

Phase 1 – Inventory: ~1-2 weeks (depending on code volume, readiness, and tooling)

Phase 2 – Discovery: ~2 weeks. Interviews and inventory report reviews.

Phase 3 – Analysis: ~2-4 weeks. Determine disposition(s), map legacy to target, identify issues & resolutions

Phase 4 – Planning: ~2-4 weeks. Build Findings & Recommendations document, generate migration pricing

At the conclusion of the assessment, an executive presentation is schedule and conducted to report the findings & recommendations and review the modernization pricing.



Assessment Resource Requirements

Client Role	Responsibilities	
Executive Sponsors	Provide executive leadership, escalation points and Steering Committee decisions	
Program / Project Manager	Oversee timeline, budget, and coordination	
Application Owners / SMEs	Convey functional and technical aspects	
Operations, Data, and Security SMEs	Convey operational, data, and security requirements	
	Identify maintenance, support, execution and management processes & issues	

Amdocs Role	Responsibilities	
Executive Sponsors	Provide executive leadership, escalation points and project decisions	
Program / Project Manager	Oversee timeline, budget, and coordination	
Modernization Architect	Define strategy, standards, modernization patterns	
Enterprise / Cloud Architect	Define strategy, standards, deployment architectures	
Technical Lead / SME	Assess source code, integrations, tech stack	
Business Analyst	Capture business processes, value, dispositioning info, provide project support	
	Define strategy, standards, risks, guidelines and options	



Assessment Process

<u>Planning</u>

- Initial meeting defines prerequisites and RACI responsibilities
- Executive sponsorship and stakeholders are identified and interviews scheduled
- Checkpoints report onboarding, infrastructure, and software readiness
- Resource requirements defined and assigned
- Project plan finalized

Execution

- <u>Inventory</u>: Using Astadia's TurnStone, we will parse collected code to identify application architecture and sizing
- <u>Discovery</u>: Facilitate in-depth workshops and interviews with SMEs to gather data, while inventory reports are reviewed
- <u>Analysis</u>: Provide a preliminary design and plan for migration, map and define target replacement of legacy technologies, capture performance and storage requirements, conduct disposition analysis
- <u>Planning</u>: Build a findings & recommendations report providing insights from the legacy systems and the go-forward roadmap for the target goals along with a Rough Order of Magnitude (ROM) of the cost and time for the migration services and tools







Assessment Process (cont'd)

Workshop(s)

- Workshop & questionnaire driven for each application (set)
- Provide insights on non-technical application environment, support, and management concerns

Technical evaluation path

- Application technology
- Application "secret sauce" or intellectual property to be maintained
- Associated license and support costs
- Skills/resource analysis
- Application volatility, update timelines and process, release methodology and timeframes
- DevOps review
 - Testing coverage and automation
- Operations considerations
- Service level agreements

Business evaluation - Dispositioning

- Fit to current business needs
- Expected change to business process
- Amount of manual process around application(s)



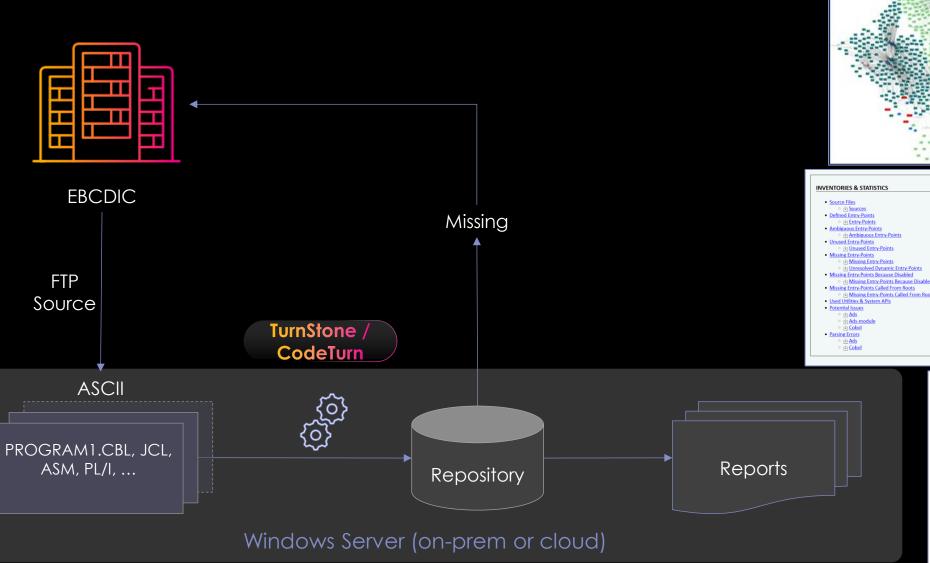
Assessment Process (cont'd)

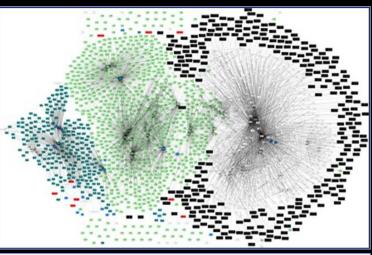
<u>Dispositioning – Key areas for analysis and scoring (where applicable)</u>

- Business goals, alignment, and value
- Technical health
- Organizational readiness and constraints
- User and stakeholder needs
- Cost and ROI analysis
- Risk, compliance and security
- Usage, dependencies and integration
- Future viability
- Timelines and conflicting projects
- Resource allocation and constraints
- Environmental impact and sustainability



Code Assessment Process





- Ambiguous Entry-Point
- Unused Entry-Points
- Missing Entry-Points
 Unresolved Dynamic Entry-Points
- Missing Entry-Points Because Disabled
- . Missing Entry-Points Called From Roots

DEPENDENCIES

- Control-Flow Dependencies Control-Flow Dependencie
- Control-Flow Graph

PER-ARTEFACT REPORTS

Program Control-Flow Info Index

- ∘ [4] Control-Flow Graph DOT File
- Control-Flow Graph SVG File · Extra Control-Flow Graph
 - o de leafs-combined DOT File o de leafs-combined SVG File
 - [↓] File type combination [4] Entry points
- Unknown parts b Debugging

Special literals

Fd data type

rin Control characters

Accented characters

TECHNOLOGY CHARACTERISTICS & METRICS

rla File types

COBOL Characteristics

- Type open
 File description properties
- Description properties
- Logical level rln Nested occurs
- Qualification need
- (all using mismatch
- (d) Goto (d) Perform goto section
- Perform with perform
- Perform with goto Next sentence

The below table will list the top-10 most used utilities.

Ranking	Program	Number of times used	Number of jcl used by
1	ABTERM	1,140	111
2	IEFBR14	309	170
3	IEBGENER	162	105
4	FTP	128	95
5	PKZIP	20	8
6	ADRDSSU	13	6
7	RHDCUCFB	5	5
8	IDMSBCF	4	3
9	IKJEFT01	3	2
10	SDSF	2	1

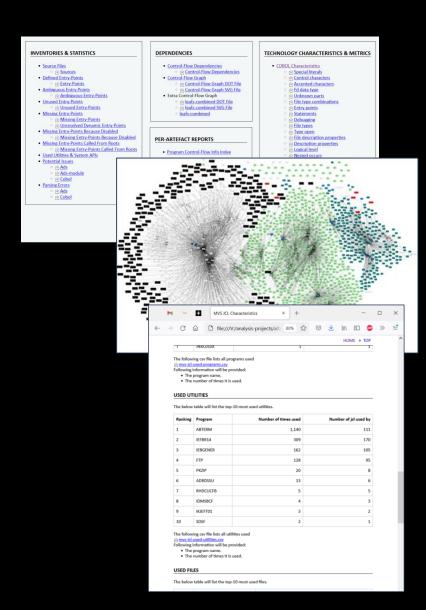
The following csv file lists all utilities used

imvs-jcl-used-utilities.csv
Following information will be provided:

- · The program name.
- The number of times it is used.

Assessment Deliverables

- TurnStone code analysis reports
 - Inventory reports for COBOL (CICS, SQL), BMS, JCL, ...
 - Missing reports for entry points, includes, copybooks, resources
- Findings and Recommendations Report
 - A solution matrix
 - Description of the current landscape, AS IS
 - Workshop results
 - Portfolio (or application) disposition results
 - Description of the target TO BE landscape, including reference architecture
 - Preliminary design and plan for a migration
- Rough Order of Magnitude of the cost and time for the migration services and tools provided by Astadia





Assessment Assumptions

- Astadia will have access to Client staff who understand the application landscape and who know where all components are located and how they can be extracted.
- Astadia will not be responsible for delays caused by the unavailability of Client personnel, hardware, or software environments necessary to perform required tasks.
- Client will respond within three (3) business days to any Astadia request for data, information, or other artifacts required to complete this project.
- The Assessment can be performed in the Astadia Cloud environment or on a Client environment. If on a Client environment, the Client costs for hardware, software, data, or other expenses that may be incurred for the completion of this assessment are not included in the cost estimate of this proposal and are not the responsibility of Astadia.
- All code and data artifacts requested will be delivered to Astadia via a secure FTP site prior to project initiation (if project performed in Astadia Cloud environment). If project performed within client environment, all software will be installed and configured, code collected and available, and Astadia project team onboarded for access to project environment prior to project initiation (Phase 0).





Amdocs Modernization Studio (Astadia) Game Changers



Automated refactoring



Replatforming IBM mainframes



Agentic Al rearchitecting / reimagining



Package implementation



Infrastructure & application management



Full service with NO vendor lock-in



100% automated code refactoring



DevOps CI/CD pipeline & ticketing integration



Highly scalable (numerous Fortune 100 references at scale)



Automated testing (online & batch)



Cloud Certifications & CSP Modernization Competency partner



Target Java or C# stack



100% functional equivalence

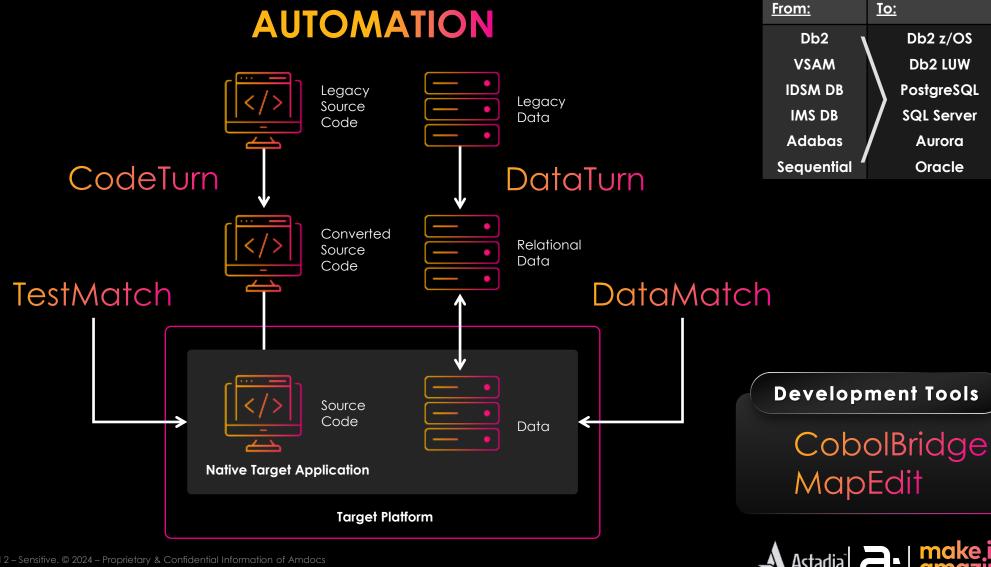


Aggressively merging GenAl with proven IP

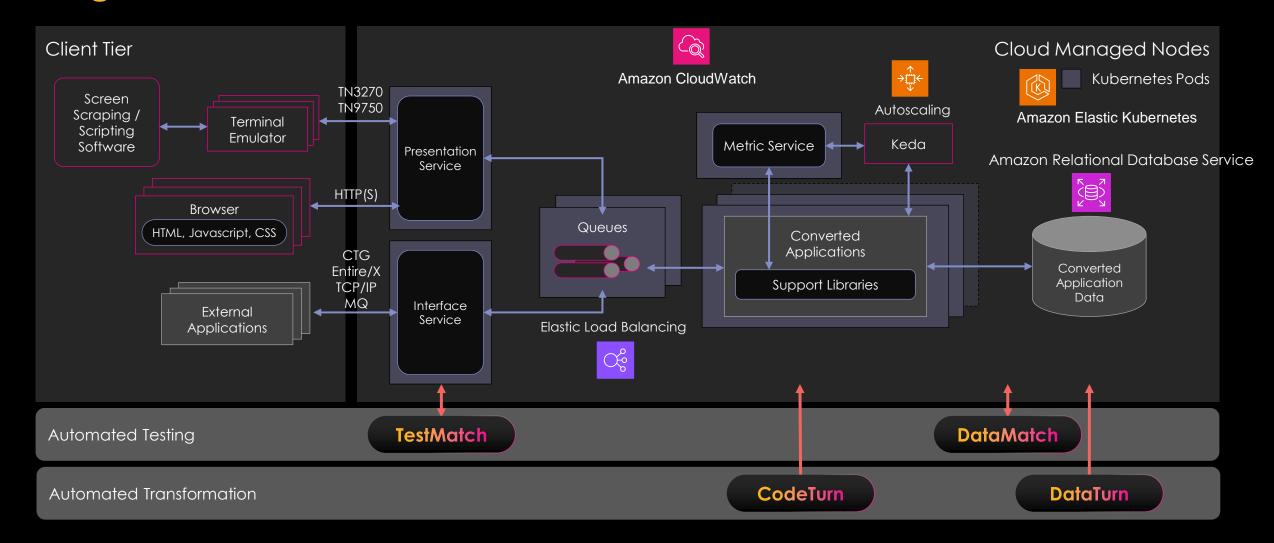


What's needed for modernization at scale?

From:	<u>To:</u>	
COBOL	Java	
COBOL	C#	
Natural	Java	
italora.	C#	
	COBOL	
IDMS / ADS	Java	
	C#	
Assembler	Java	
Assemblei	C#	
JCL	PowerShell	
	Bash	
PL/I	Java	
FL/I	C#	
CICS BMS		
IMS TM MFS	XML/HTML	
IDMS TM Maps	AML/ HTML	
Natural Maps		

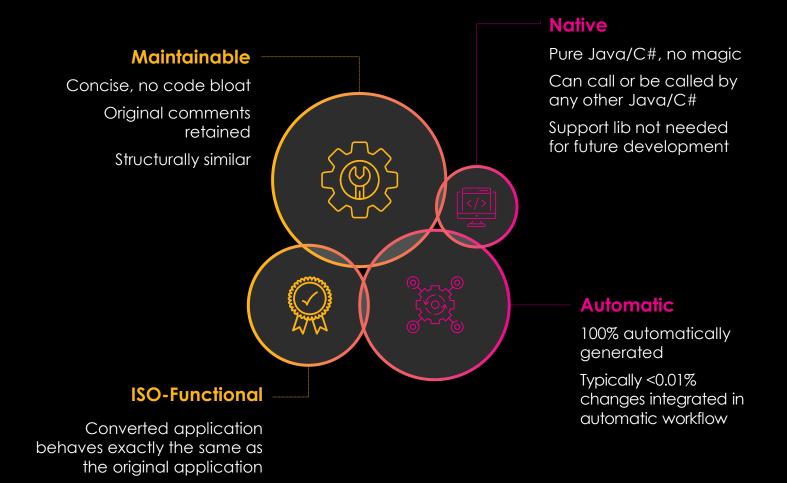


Target Online Architecture





CodeTurn Design Goals

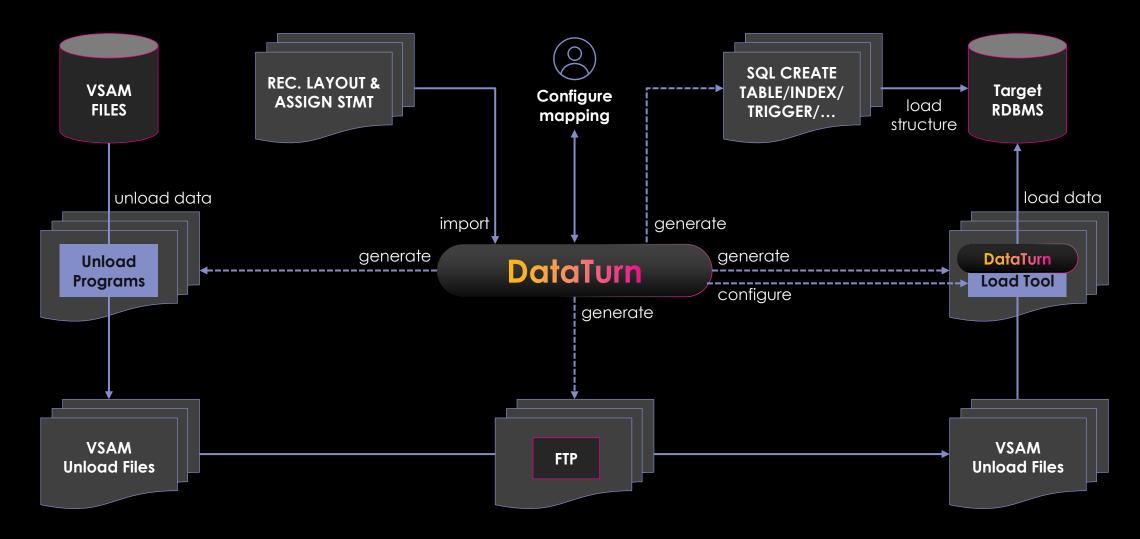


CodeTurn

From:	To:
COBOL	Java
COBOL	C#
Nadawal	Java
Natural	C#
IDMS / ADS	COBOL
	Java
	C#
Assembler	Java
	C#
101	PowerShell
JCL	Bash
51.7	Java
PL/I	C#

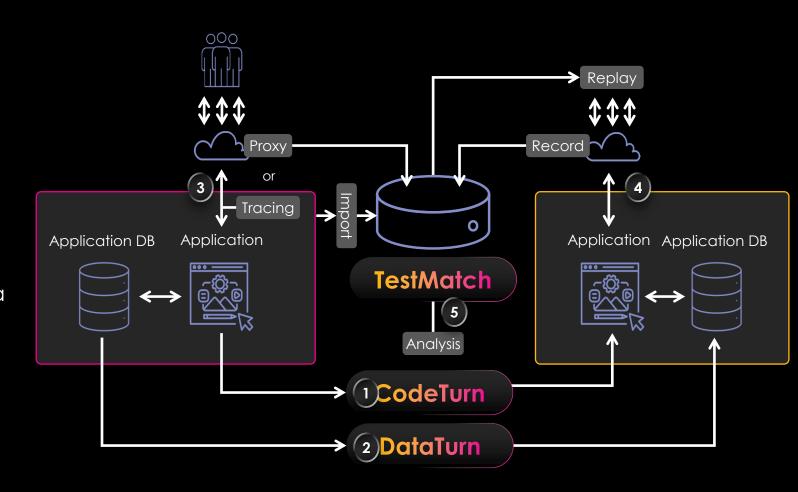
Enables automatic compare

Data Migration Process (e.g. VSAM)



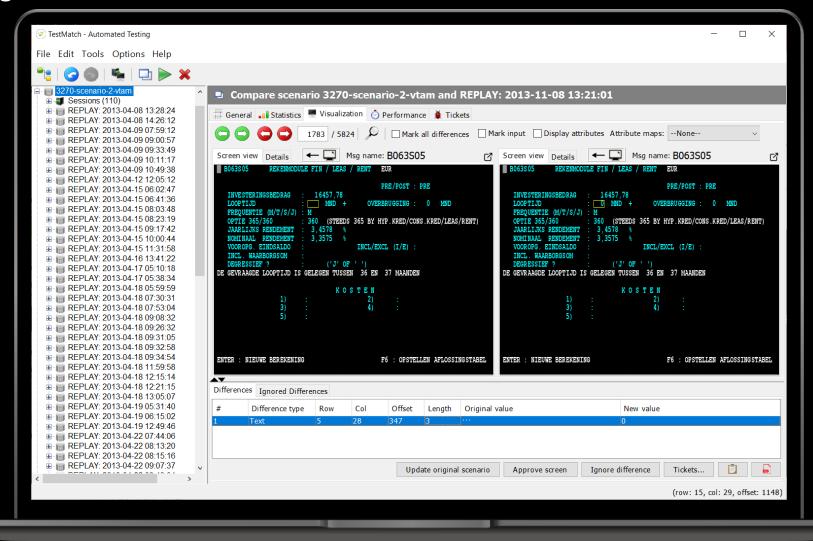


- Record test cases for automated replays
- Create Ignore Rules for timestamps
- Handles altered applications, technical differences like sort sequence
- Resets/restores database state for iterative test cycles
- Conduct dynamic tests using variable data
- Controllable delays for user "think time"
- Conduct performance and load testing
- Integrates with CI/CD pipelines and ticketing systems



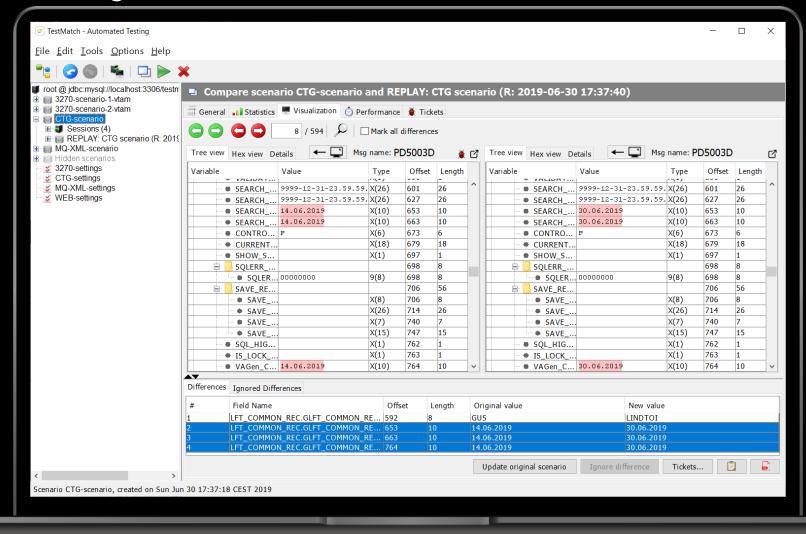


Terminal messages



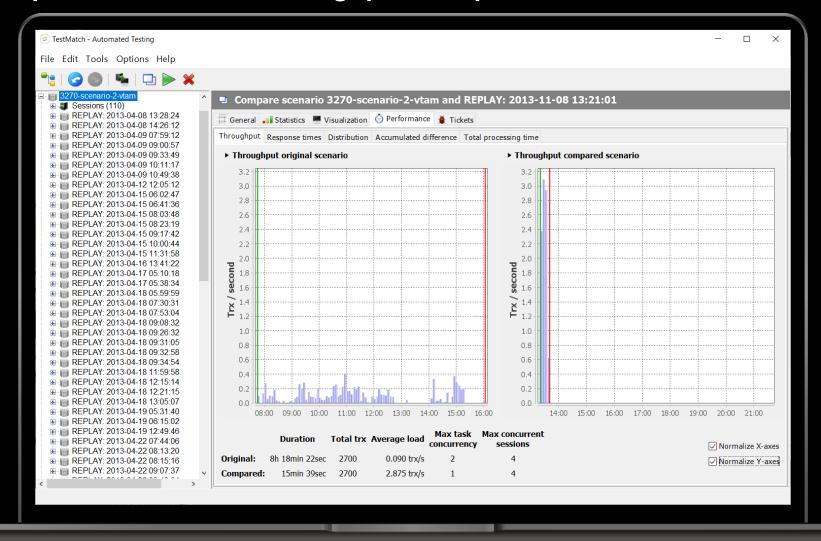


MQ / data buffer messages



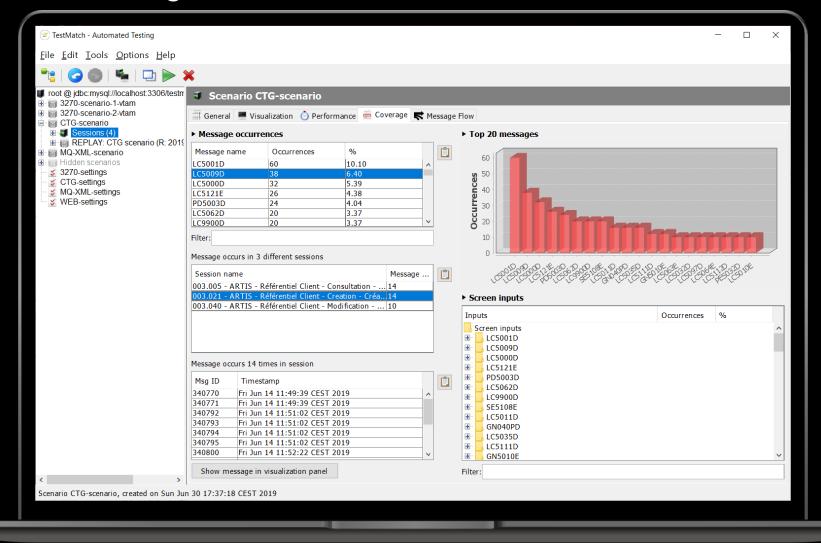


Performance: Response, duration & throughput comparison



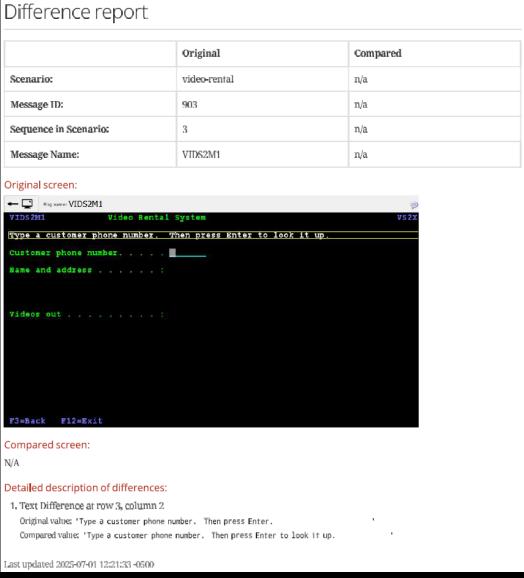


Transaction / screen coverage





Test issue: Exportable Difference Report





DataMatch: Automated batch testing

DataMatch is used to confirm batch processing occurred correctly by ensuring accuracy of data was updated



Validate **iso-functional behavior** of migrated batch jobs and data intensive online applications



Three-way compare of database states on source and target platforms: 1: before 2: after/reference 3: after/actual



Integration with **ticket tracking systems** to report and follow-up on detected differences



Highly configurable: what tables to compare, what key-ranges, what columns

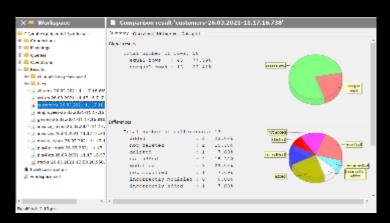


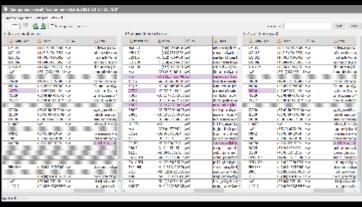
Can be **scripted**, e.g. start comparing as soon as job complete



Can be integrated in CI/CD pipelines

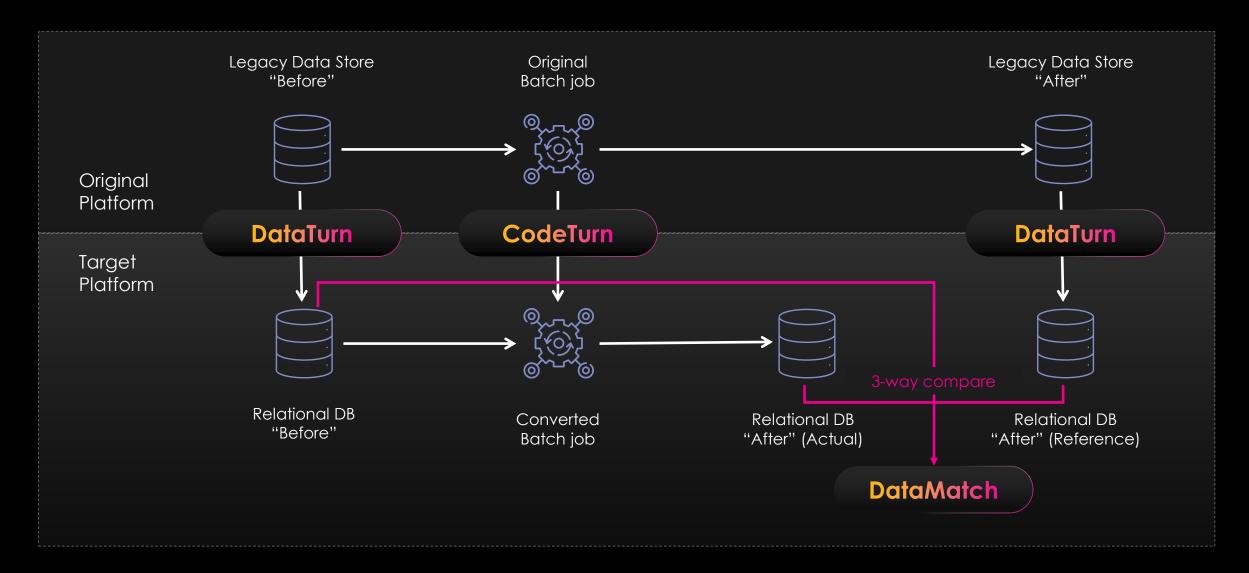
DataMatch







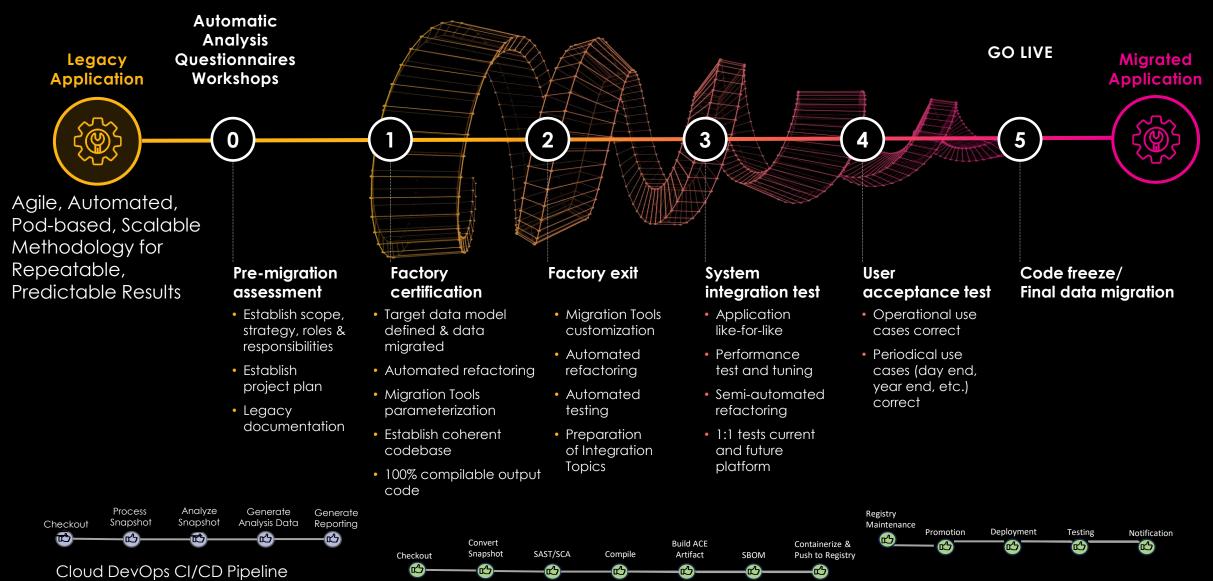
DataMatch







The FastTrack Process: Modernizing at scale





NextGen Rearchitecture: Transformation intelligence for next-gen applications -TINA

Rearchitecting to microservices



Transformation intelligence for next-gen applications

A digital consultant designed to accelerate the development journey from a refactored application to a new rearchitected application using microservices



Understand & document refactored applications

Extract business functionality

Interactive ChatBot for developers

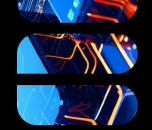
Respond to request for documentation and developing specifications for APIs and new micro services capturing relevant business functionality for specific use case

- Provides an Agent interface to Astadia's classic discovery and refactoring tools
- Important for integrating into other Agentic Frameworks, i.e., AWS Transform, Azure Copilot, GCP Gemini



Astadia Modernization Agent & Code Assistant

Specifically designed to provide modernization workflow



DISCOVERY

Enhanced, interactive application discovery

CONTEXT

Builds detailed
documentation of
application and
semantic
understanding of
business logic

OTHER INPUTS

Understands
external design
docs, coding
standards docs
and APIs

CODE GENERATION

Builds API
framework for
services and
populates with
business logic from
application



LLM Agnostic | Limits exposure of customer source code to external models



The Journey from Mainframe to Microservices

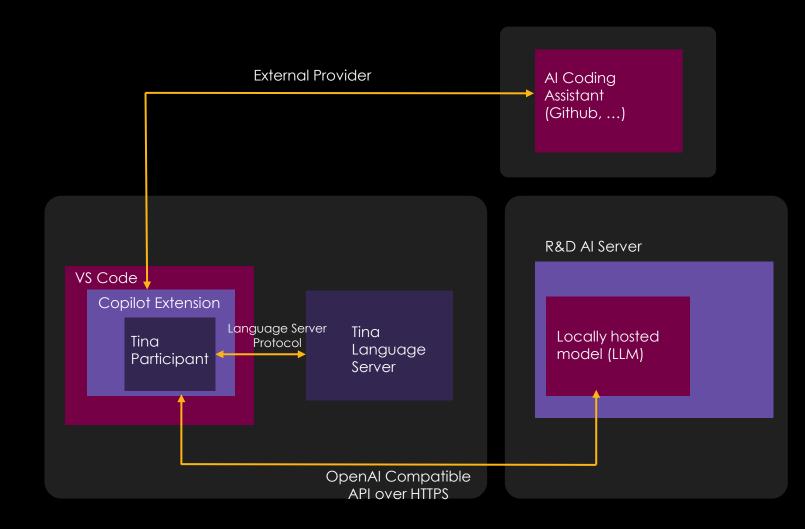
Mainframe Transformation Options

Rearchitecting to a Business Domain Rewrite Architecture Mainframe Microservices **Applications** 3 Pattern 1 Rearchitect Go into production Refactor Microservices Mainframe Pattern 2 Refactor Rearchitect Mainframe Microservices



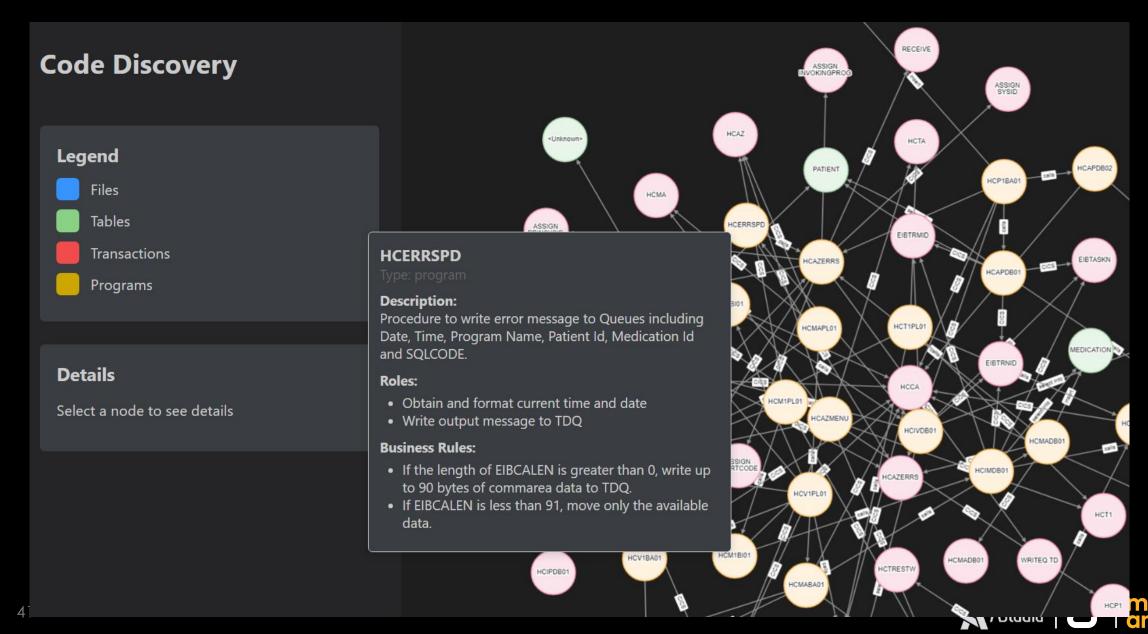
Tina architecture and characteristics

- Agentic workflow processes for discovery, documentation and code generation
- Ensures the quality of the input and output
- Generates predictable, repeatable, scalable workflows
- Provides robust error handling with automatic retries
- Constrains the LLM to execute the same operations in a repeatable, consistent manner
- Overcomes the inherent problems of GenAl (output quality, hallucinations, completeness, repeatability, ...)



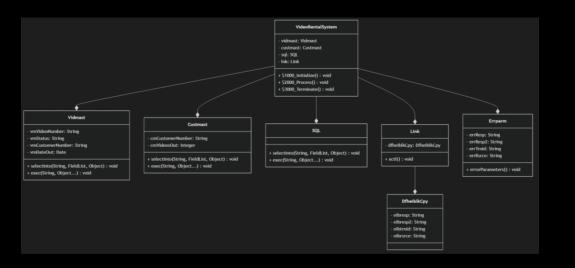


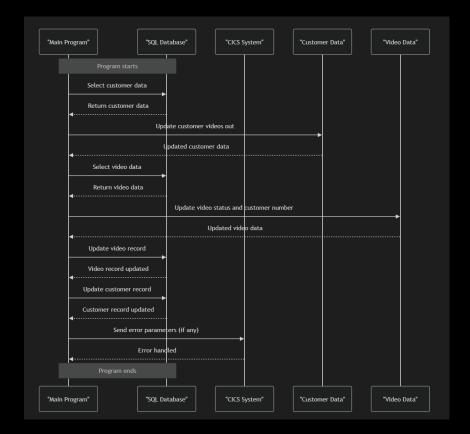
Tina application discovery

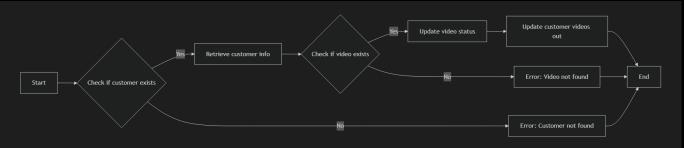


Tina discovery output sample charts

- Class diagrams
- Sequence diagrams
- Flowcharts









Identifies and documents business logic

- Builds context of application
- Semantic understanding of application functionality
- Identifies business rules and cross references with lines of source code
- Allows identification of business logic throughout application (not just at individual program level)
- Can isolate business rules for cross application functions to support development of microservices

Business Rules Documentation for Customer Service

Introduction

This documentation outlines the business rules related to customer service in our system. It provides a comprehensive overview of the rules, their locations, and references to relevant code files.

Business Rules

The following business rules are related to customer service:

- 1. Customer must enter a valid customer number.
 - Location: vidp4x.java > code > business rules
 - Reference: vidp4x.java (Line 123)

2. System checks if the customer exists in the database

- o Location: vidp4x.java > code > business_rules
- Reference: vidp4x.java (Line 125

3. If the customer has no videos rented, an appro

- Location: vidp4x\.java > code > busir
- Reference: vidp4x\.java (Line 127)

4. User can select videos to return using a slash (/

- Location: vidp4x.java > code > busine
- o Reference: vidp4x.java (Line 129)

5. At least one video must be selected for return.

- o Location: vidp4x.java > code > busine
- Reference: vidp4x.java (Line 131)

6. Video status is updated to reflect return and cu

- o Location: vidp4x.java > code > busine
- Reference: vidp4x.java (Line 133)

7. Error handling includes SQL errors and invalid (

o Location: vidp4x.java > code > busine

Business Rules

The class enforces the following business rules:

- Customer must enter a valid customer number.
- System checks if the customer exists in the database.
- If the customer has no videos rented, an appropriate message is displayed.
- User can select videos to rent using a slash (/).
- · At least one video must be selected for rental.
- Video status is updated to reflect rental and customer's rented video count is incremented.
- · Error handling includes SQL errors and invalid user inputs.

In summary, the vidrent.cbl class manages video rentals by interacting with customer and video rental database tables. It performs various queries, uses CICS transactions, calls other programs, and enforces business rules to ensure correct rental operations.



Automated creation of microservices

- Based on contextual understanding Tina builds specification documentation for new microservices
- Tina passes specification information to code assistant requesting generation of code for the new microservice
- Only specification documentation is provided to code assistant no source code is exposed to remote, public LLMs

```
@workspace /new please create a java project to implement the
customer service including the business rules
 {} discovery.json
     Workspace
 Used 1 reference
Sure, here's a proposed directory structure for a Java project to
implement a customer service syste namespace VideoRental.API.Services
                                           public class RentalService

✓ customer-service-system

                                               private readonly RentalRepository _rentalRepository;

✓ src

                                               private readonly ICrmApiClient crmApiClient;
      main
                                               public RentalService(RentalRepository rentalRepository, ICrmApiClient crmApiClient)
          java / com / example
                                                   rentalRepository = rentalRepository;
                                                   crmApiClient = crmApiClient;
          J CustomerServiceApplication

✓ controller

                                               public async Task<List<Rental>> GetAllRentalsAsync()
           J CustomerController.ja
                                                  var rentals = await _rentalRepository.GetAllAsync();
                                                   return rentals; // Assuming RentalEntity is mapped to Rental model

∨ model

           J Customer.java
                                               public async Task<Rental> RentVideoAsync(int customerId, int videoId)

✓ repository

                                                   var customer = await _crmApiClient.GetCustomerByIdAsync(customerId);
           J CustomerRepository.ja
                                                      throw new Exception("Customer not found.");

✓ service

                                                  var rental = new Rental
           J CustomerService.java
                                                      CustomerId = customerId,
                                                      VideoId = videoId.

    ✓ resources

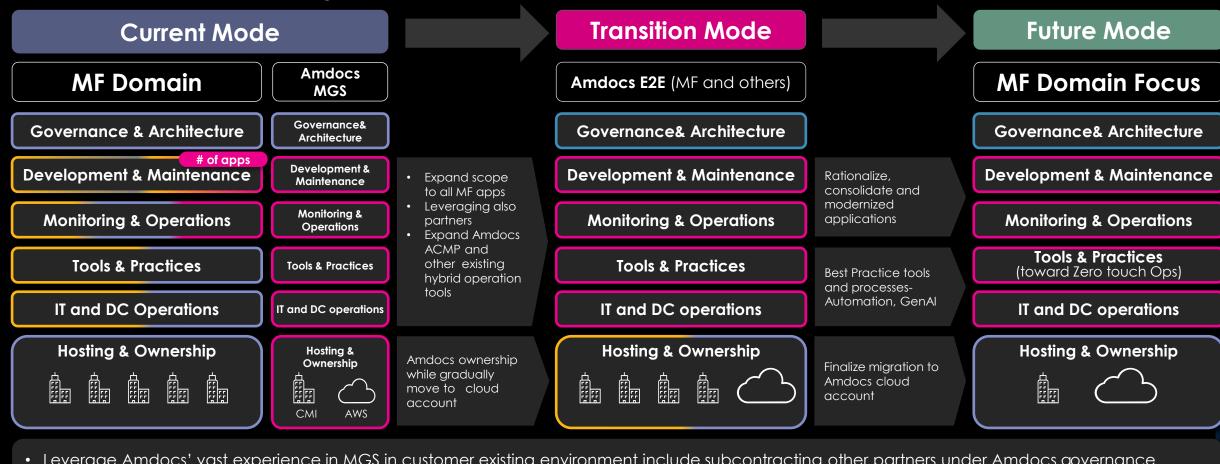
                                                      RentalDate = DateTime.UtcNow.
                                                      ReturnDate = null
          = application.properties
```



Other Vendors

Amdocs Approach for Mainframe Services

Customer retains the centralized governance and architecture. Transfers E2E responsibility for application development, support and hosting to Amdocs.



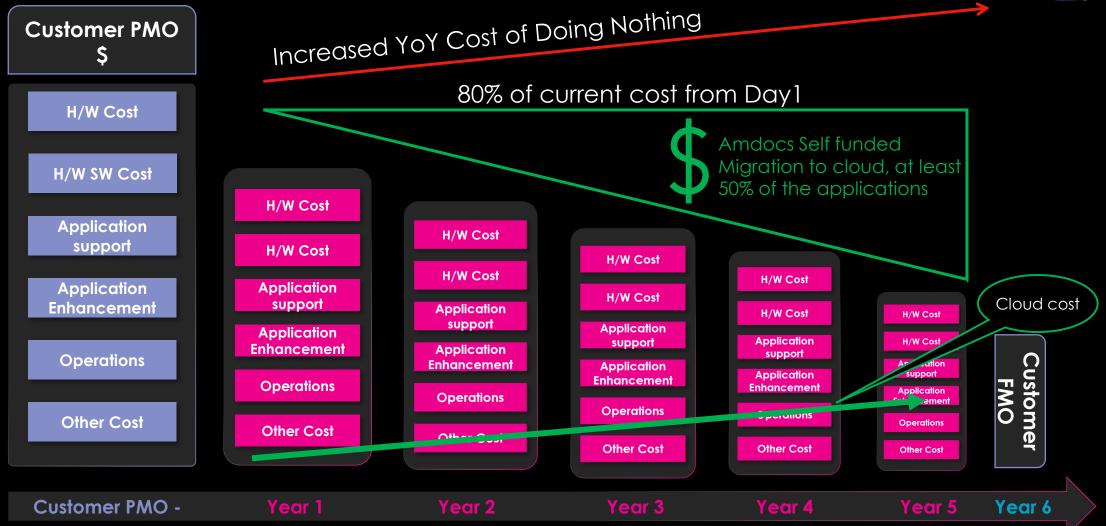
- Leverage Amdocs' vast experience in MGS in customer existing environment include subcontracting other partners under Amdocs governance
- Synergies with the current Amdocs operation
- Expand Amdocs' MF support team to handle additional applications high synergy and practices streamline
- Utilizing Amdocs ACMP, SPOG, GenAl powered for near zero-touch operations



Commercial Feedback

Commitment to success | Self-funding migration







Mainframe Modernization & Migration to the Cloud

TIER 1 Telco in NORTH AMERICA

E2E responsibility for migration to cloud, application development, support, and MF operations transfers to Amdocs

Reduced number of servers

Storage reduction

ISV footprint reduction

Considerably reduced number of MF hosted apps

Business Needs

- Leverage Amdocs's vast experience managing the CSP's services including subcontracting under Amdocs control
- Implement optimization processes to consolidate LPARs and reduce MF footprint
- Evaluate the existing environment and implement the best CSP and Amdocs tools to improve monitoring and automation
- Migration of COBOL, assembler and PL/I legacy applications to Java



Solutions

- Infra & system operations
- App maintenance & development of 98% CSP MF applications (previously ~50%)
- App transformation & migration to cloud:
 - Hundreds of apps to be modernized (code converted to Java)
 - ~80 different technologies
 - Reduction of MF servers and thousands of MIPS



Customer Value

- Modernization enable and support applications' modernization roadmap
- Reduction in Risk E2E accountability. Proven methodology and practices
- Operational Resilience/ Enhanced Security & Compliance
- Cost Reduction & Future Proofing Reduction of maintenance costs for legacy hardware & software.
 - MF HW/SW footprint reduction (~50%) due to migration and LPAR optimization
 - Vendor consolidation
- Technology debt reduction
- Enjoy **cloud benefits** as elasticity for the migrated apps
- Increased staff productivity & efficiency
- · Improved business agility



Accelerating modernization with refactoring at scale

A leading insurance provider

Global



Accelerated modernization by using 99% automated process for refactoring code



Lowered costs by exiting increasingly expensive maintenance contracts with ISVs



Improved agility with modern languages and cloud-based infrastructure



Fueled innovation by freeing the business from legacy constraints

Why modernize

Lower mainframe costs

• Maintenance costs related mainframes surging in recent years

Improve agility

- Outdated programming languages limit the ability to adopt nextgeneration technology
 - Customers expect a modern digital experience

Retiring mainframe specialists

- Mainframe talent in short supply with specialists nearing retirement age
- Young IT talent has no interest in working with outdated technology

Amdocs Solution

Automated modernization

- Converting 10+ outdated programming languages to Java and other object-oriented languages at scale
- Refactoring ~170 applications in COBOL, assembler and PL/I across six mainframe systems

Lower costs

Modernization and migration to the cloud lowers costs by as mush as 80%

Increased innovation

- Modern, cloud-based systems enable the use of GenAl and advanced analytics
 - Business users empowered to innovate without legacy constraints
 hampering ideas

This leading global insurance provider has been providing peace of mind to its customers for over a century, offering a wide range of insurance products and services across 29 countries



Deutsche Bank | Deutsche Asset Management (DWS)





- IKS on obsolete platform (Natural & Adabas)
- Impending skills issues
- Reduce costs
- Improve efficiency
- Increase agility



SOLUTION

- Migrated 1.3 million lines of Natural code to C#
- Converted 15.7TB of Adabas data into a modern stack (SQLServer)
- Entire-X replacement
- JCL replaced by PowerShell
- How?: Astadia FastTrack Factory
 - CodeTurn
 - DataTurn
 - TestMatch
 - DataMatch



IMPACT

- Cost savings of €5,750,000 per year
- Eliminated obsolete technology
- Batch performance: duration of most challenging program went from 179 mins to 39 mins
- The applications now run in a modern environment on a fully virtualized server platform.
- Established one development team for front-end and back-end
- Further enhanced the application into a digital investment platform that is now offered to the market

5,750,000 euro Annual savings Converted 1.3 million lines of code and 15.TB of data



Société Générale France





- Eliminate mainframe with obsolete technology (Adabas & Natural)
- Impending skills issues
- Reduce maintenance costs
- Improve efficiency
- Increase agility



SOLUTION

- Migrated the bank's legacy Natural-Adabas application with several million lines of code to a Db2 environment
- How?: Astadia FastTrack Factory
 - CodeTurn
 - DataTurn
 - TestMatch
 - DataMatch



IMPACT

- Cost savings
- Eliminated obsolete mainframe technology
- Increased agility
- Further modernization using the Astadia FastTrack Factory

"By licensing the Astadia FastTrack Factory we will be able to execute the migration of the rest of the portfolio on our own rhythm and speed, and plan and prioritize the work much more dynamically in the future, instead of being tied to a strict contract" - Deputy Head of Support Mainframe & Projects



Foyer Insurance | Foyer Group





- Legacy technology hindering development and digital transformation initiatives
- Reduce maintenance costs
- Impending skills issues
- Improve efficiency
- Increase agility



SOLUTION

- Refactored mainframe COBOL and EGL based legacy to a Linux and Java based modern platform
- How?: Astadia FastTrack Factory
 - CodeTurn
 - DataTurn
 - TestMatch
 - DataMatch



IMPACT

- Creating an open infrastructure that improves interoperability
- Opening the way to the cloud
- Limiting the number of technologies required for development and implementation
- DevOps integration to optimize the development cycle and achieve continuous industrialization of deliveries

Source

Enterprise COBOL programs EGL programs EGL JSF / JSP back EGL JSF / JSP front **JCL** Db2 tables SAM files

Target

Java Java Java **JavaScript** Bash Db2 LUW Unix files

Automation

100% 100% 100% 100% 100% 100% 100%



Shaw Industries





- Reap cloud benefits
- Impending skills issues
- Reduce costs
- Improve efficiency
- Increase agility



SOLUTION

- Conversion of mainframe programs and integration components
- Conversion of mainframe databases and files
- Conversion of batch processing
- How?: Astadia FastTrack Factory
 - CodeTurn
 - DataTurn
 - TestMatch
 - DataMatch



EXPECTED IMPACT

- Eliminate obsolete technology
- Move to open-source, cloud-based platforms
- Achieve significant cost savings
- Free teams from dependency on shrinking pools of COBOL and Assembler expertise
- Enable faster deployment cycles, continuous integration, and responsiveness to changing business needs
- Position the organization for future integration with AI, analytics, and microservices

Convert 8+ million lines of code and migrate legacy technologies such as COBOL, Assembler, Db2, VSAM



