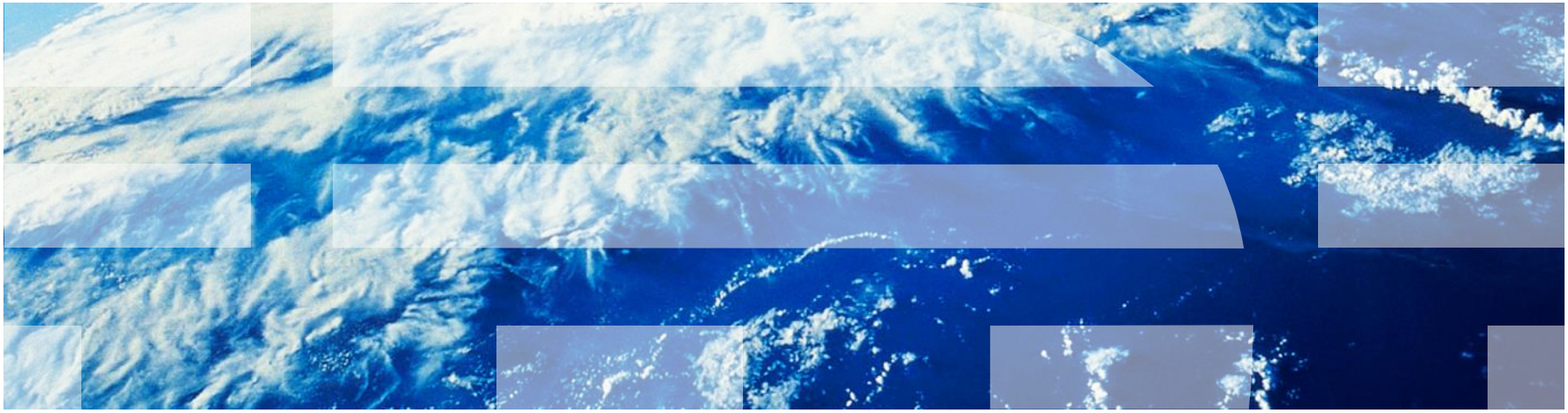
Using Operation Decision Manager for z/OS

- what every developer needs to know

Richard Szulewski - ODM for z/OS Product Manager

Chris Backhouse - ODM for z/OS Architect



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Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Business Decisions are Everywhere

We need to add an eligibility check to meet the requirements of the new regulation.

Let's create a special promotion for our best customers.

Can we automate approvals for this type of order?

And They Change Frequently

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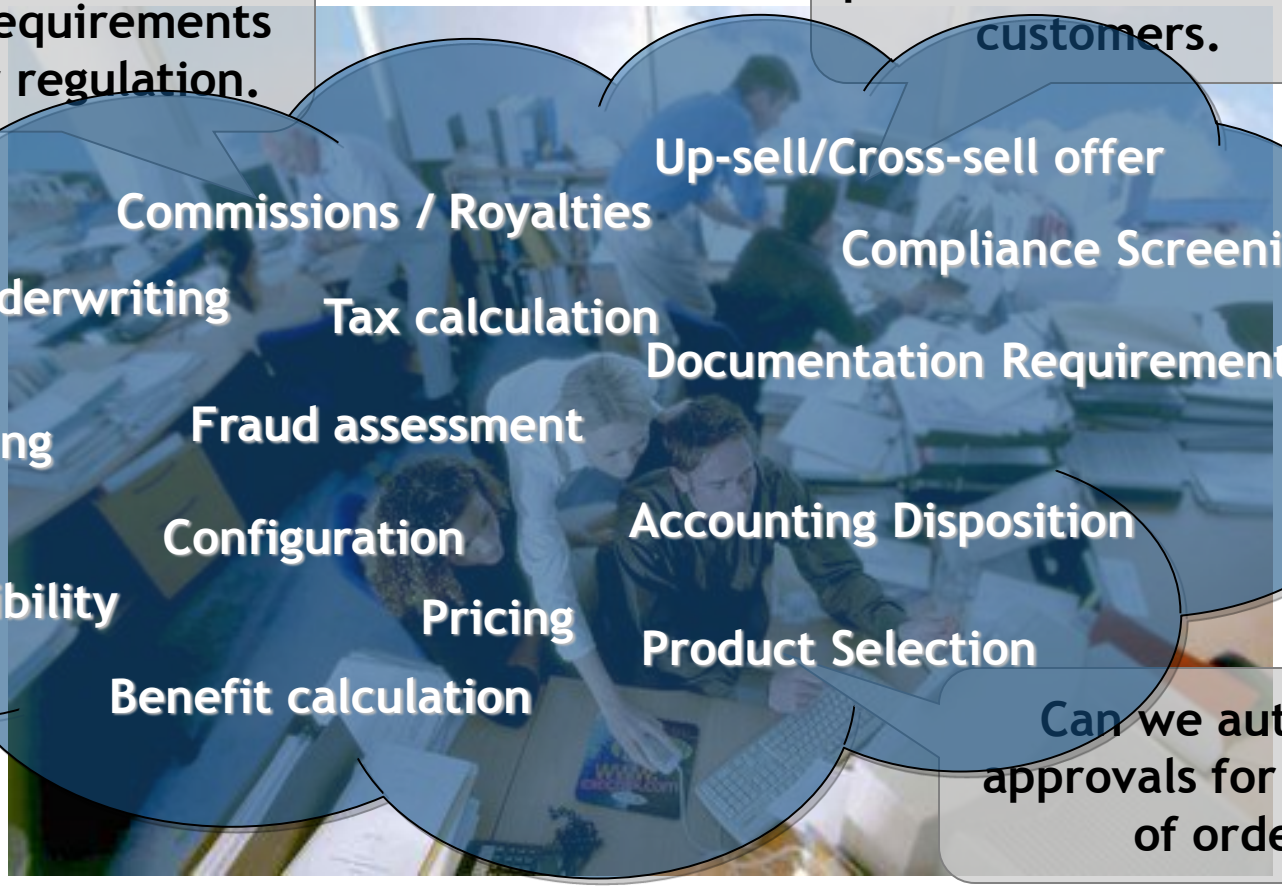


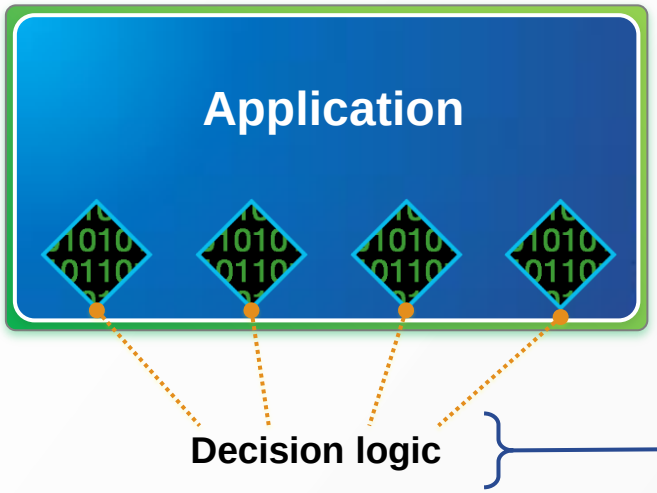
Can we automate approvals for this type of order?

And They Change Frequently

Externalize Decisions from Applications into Rules

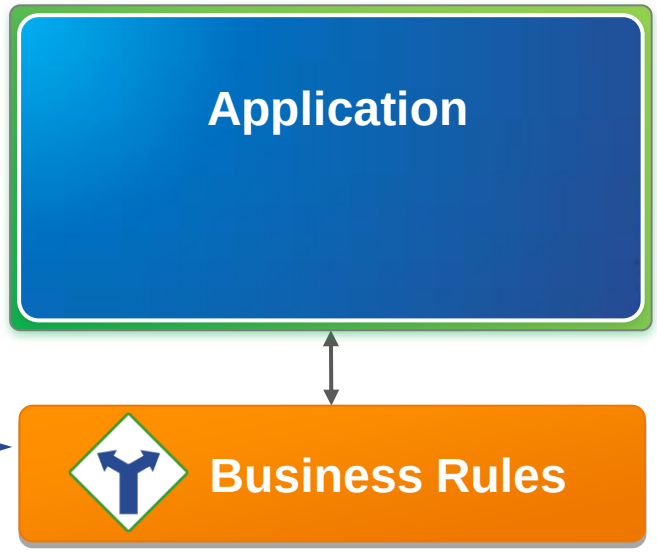
Manage decision logic independently from applications

Without Decision Management



- Rules written in software code cannot be read by business people
- Hard coded rules are difficult to change
- Rules intertwined within applications cannot be reused by other systems

With Decision Management



- Natural language rules can be easily read
- Externalized rules are easy to change
- Centralized rules enable reuse and consistency

Manage Decisions at the Speed of Business

Major system updates are not required for decision logic changes

1

- Customer searches for a price
- Insured members submit claims
- Brokers make trades

requests

Application

response

Business Rules

Decision Logic

Determine pricing & bundling

Approve filed claim

Detect fraudulent trades

Why Decisions Change?

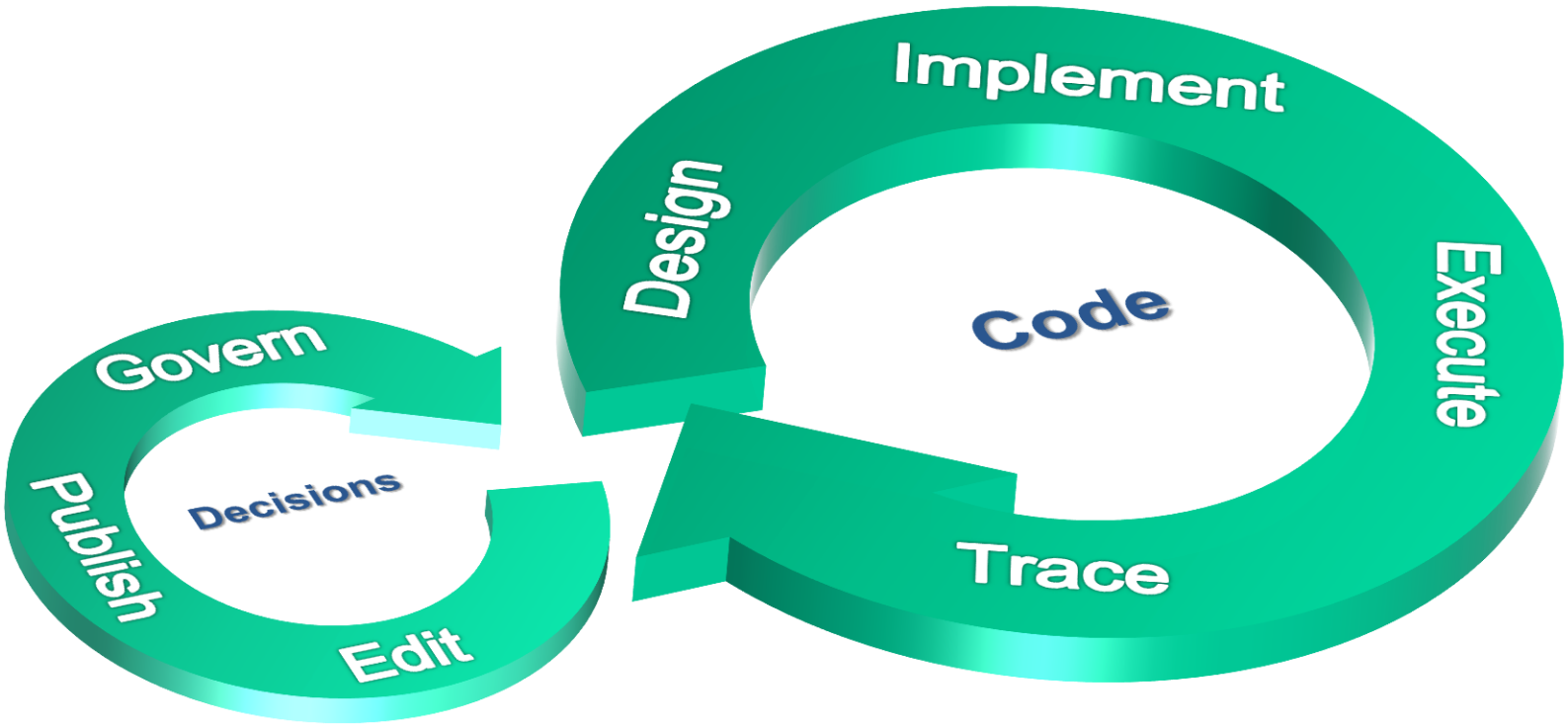
- Grow customer base
- Increase customer satisfaction
- Comply with regulatory changes

2

Business Rule Updates

- New pricing promotion ***(monthly)***
- Updated claims policies ***(quarterly)***
- Tightened regulations on trading ***(annually)***

Redefined Application Change Cycle



Business - IT

Decisions / Policies

Days / Weeks

Developer

Functions / Tasks / Flow

Weeks / Months

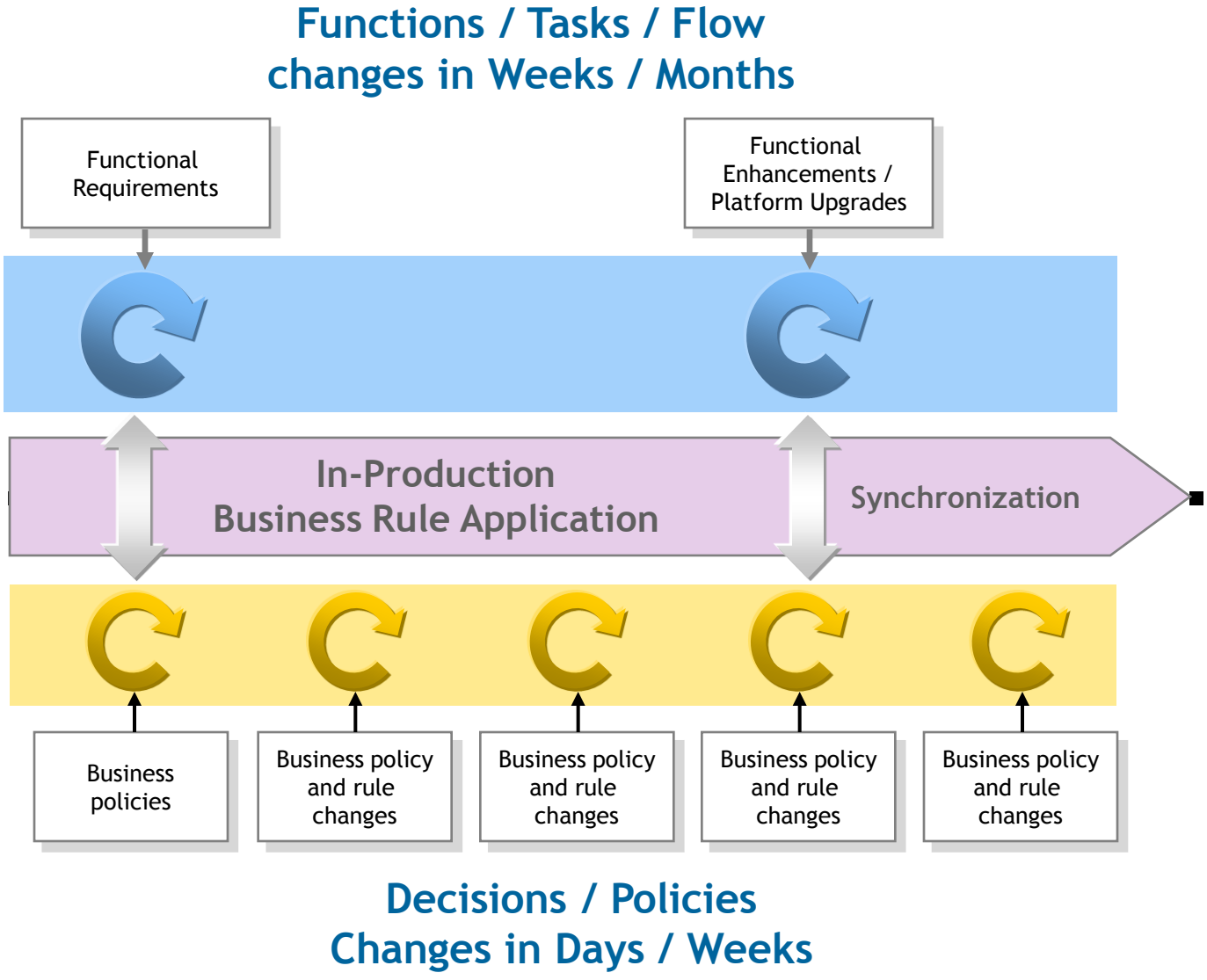
Separate Application and Rule Lifecycles

Application Developer

Application Development

Business Rule Management

Business & IT



What does ODM bring to z/OS?

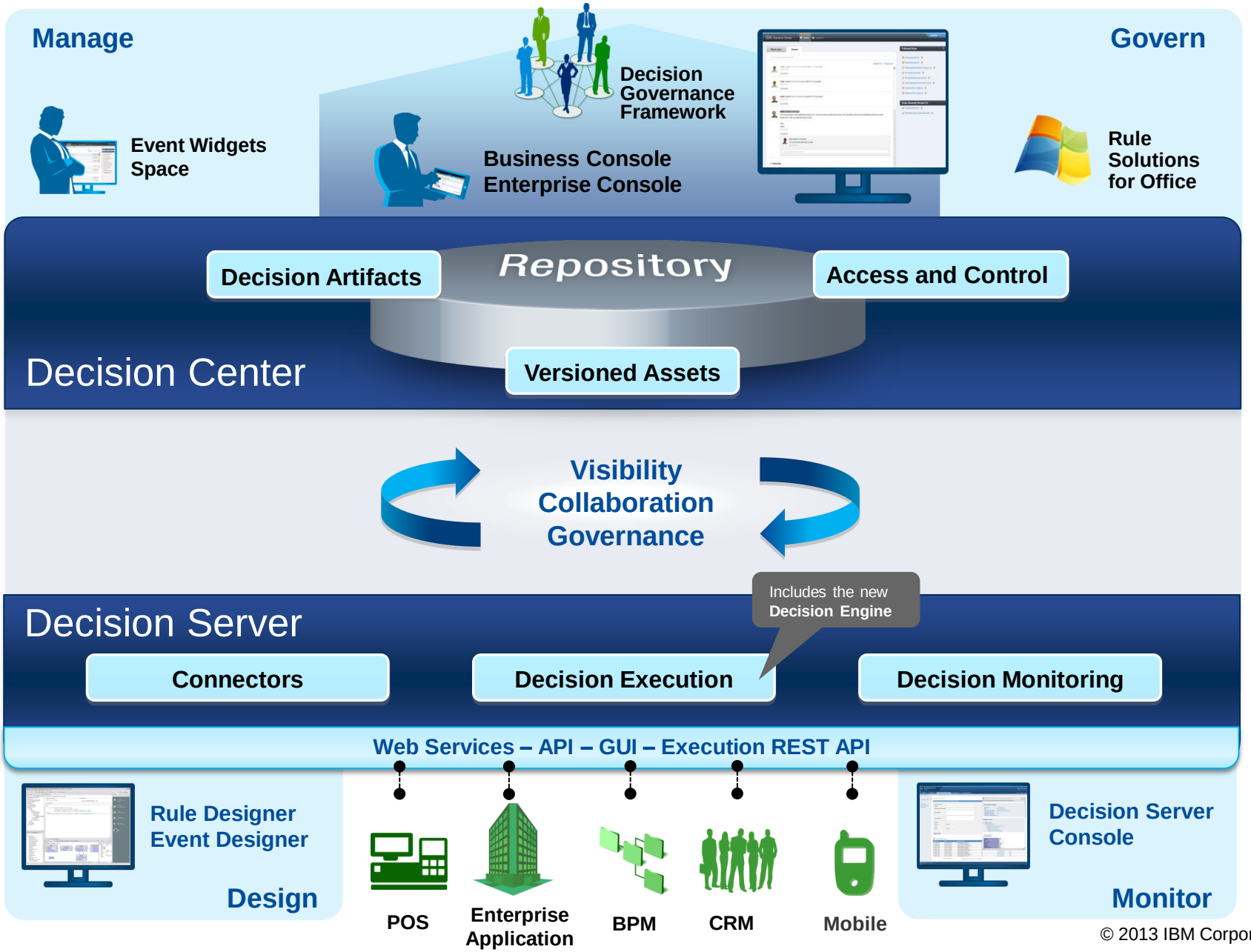
Challenges for Most z Clients

1. **Consolidation, Isolation, Extension or Extinction of application portfolio**
2. **Be able to react to increasing variety and volume of change requests**
3. **Sharing business rules across platforms & channels**
4. **Ensuring seamless business experience in migration/ application evolution**

Benefits of the ODM Approach

- ✓ **Cost savings**
  - – Shorter change cycle, without increased business risk
  - – Rule engine processing is zAAP eligible
- ✓ **Improved agility**
  - – Improved Time to Market
  - – Manage business decisions in natural language
  - – Decouple development and business decision change lifecycles
- ✓ **Single version of the Truth**
  - – Consolidated and shared expression of business policy
  - – Maintainable with a Center of Competency model
- ✓ **Incremental Adoption**
  - – Deploy decision methodology one decision at a time
  - – Focus on decisions that need to change often & quickly
  - – Expand adoption of "market validated" decisions

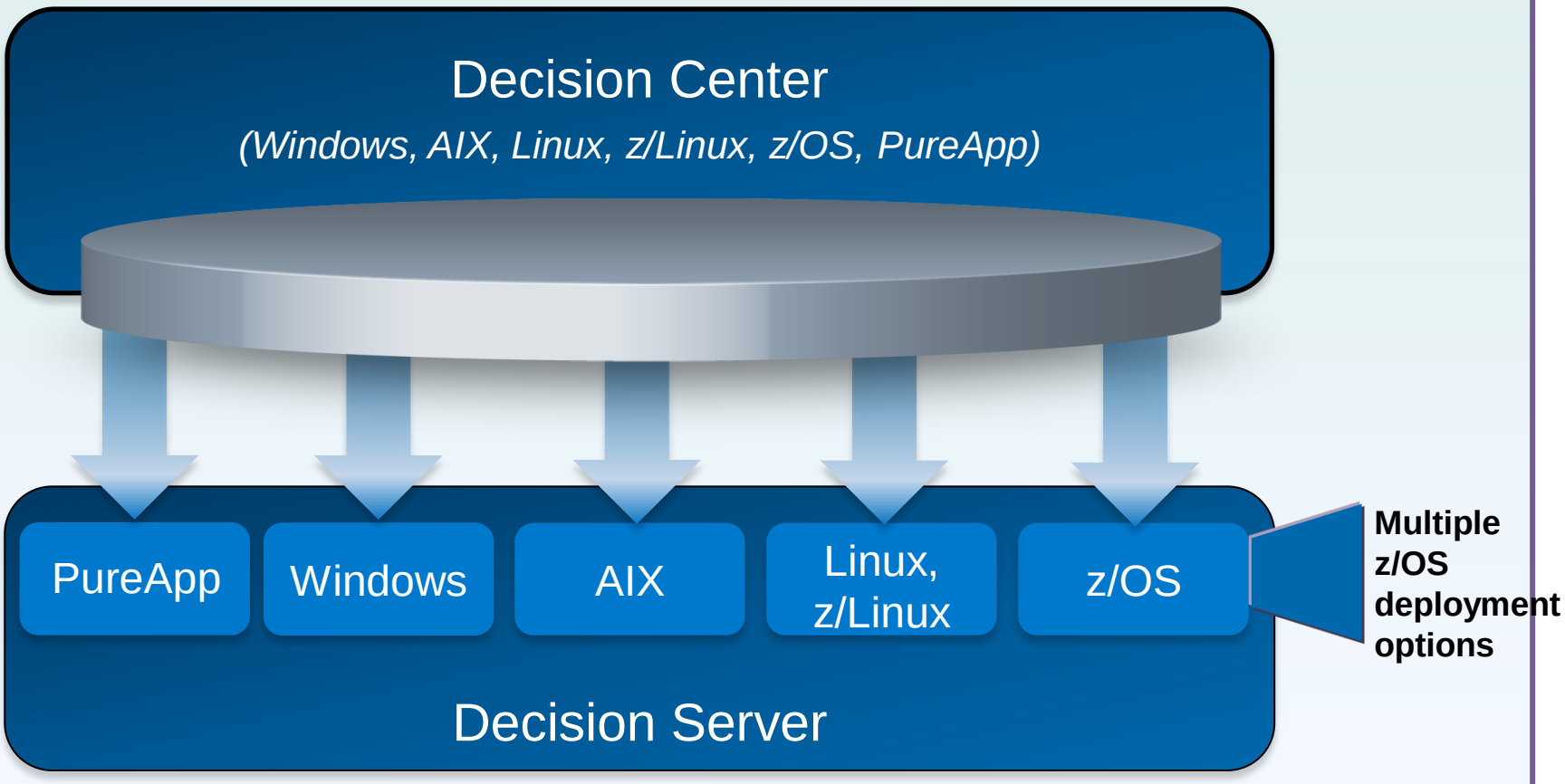
IBM Operational Decision Manager 8.5.1



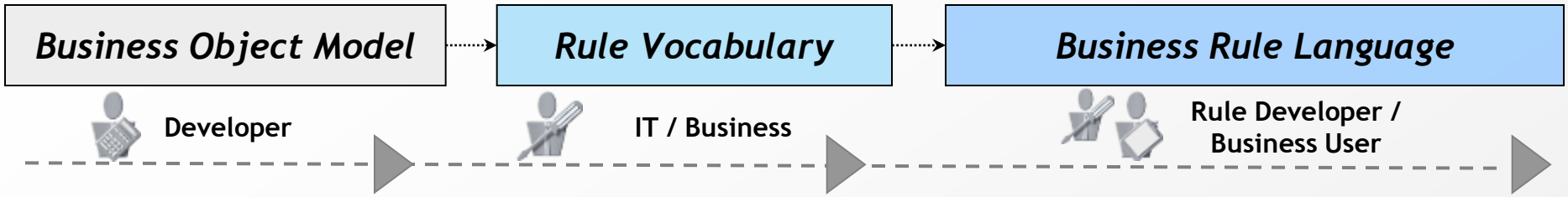
IBM Operational Decision Manager

Runtime support

Leverage a wide range of platforms to meet the varying needs of enterprise architectures



ODM Brings the IT and Business World together




```
01 CUST
  05 NAME
  05 AGE
  05 NUMACCIDENTS
  05 RISKLEVEL
```

"customer"

- the name of …
- the birthday of …
- the number of accidents of …
- the … is a high risk driver

Rule: High risk driver

if

the birthday of customer is after **12/9/1975** and the number of accidents of customer is at least **3**

then

set the customer as a **high risk driver**

- Automatic generation of the rule vocabulary.
- Comprehensive industry focused business terms to define its data and associated actions.
- Localizable vocabulary

"client"

- le nom du …
- l'anniversaire du …
- Le nombre d'accidents du …
- le … est un conducteur à risque …

Règle: Conducteur à risque

si

L'anniversaire du client est après le **12/9/1975** **et**
le nombre d'accident du client est au moins **3**

alors

Classer le client comme **conducteur à risque**

Rule and Event Designer

Comprehensive technical environment

Design

- Rules and events business objects
- Vocabularies
- Projects structure and organization
- Rule Templates

Test

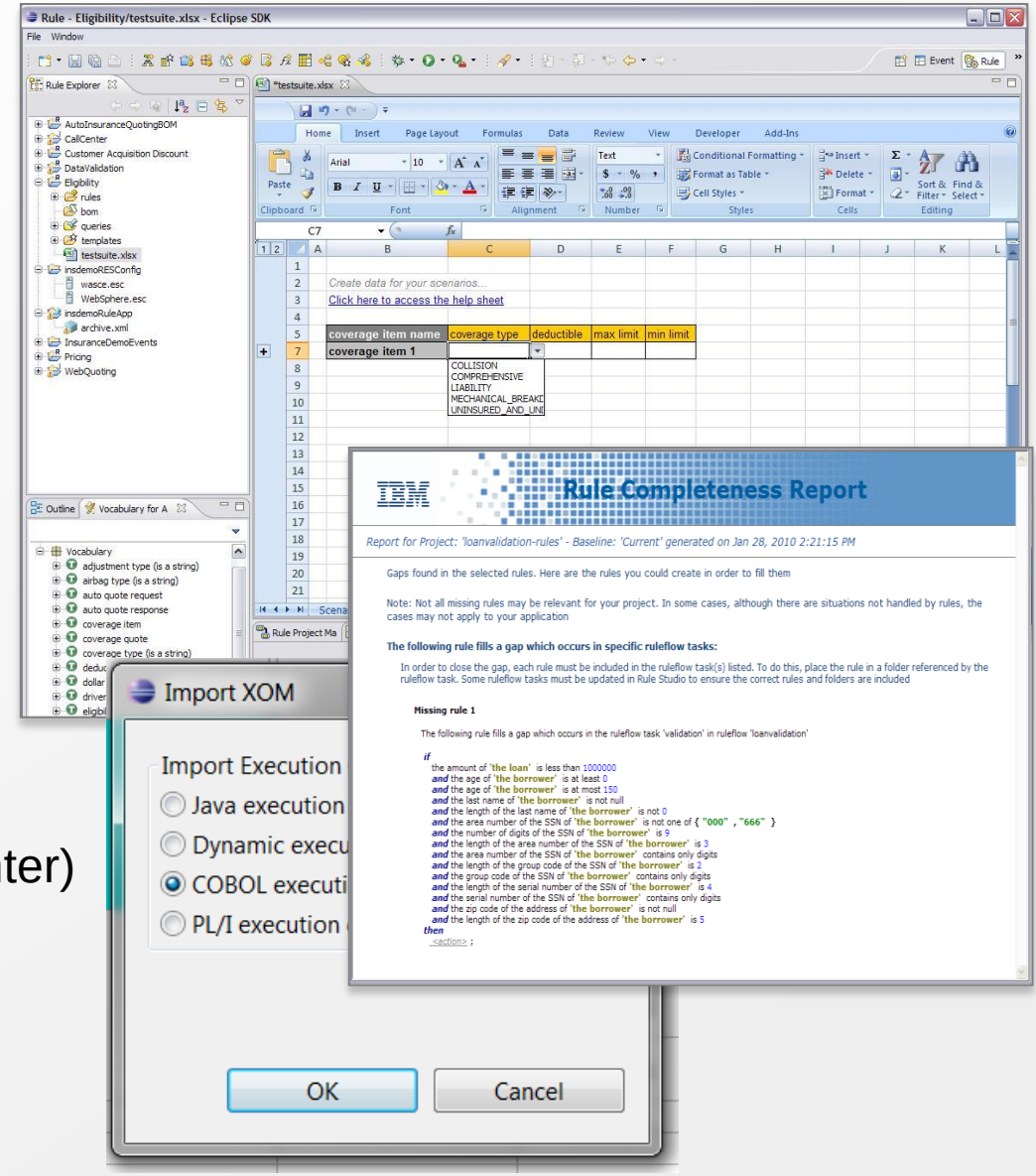
- Step by step debugging
- Value inspectors
- Test and simulation suites
- Completeness reports

Configure

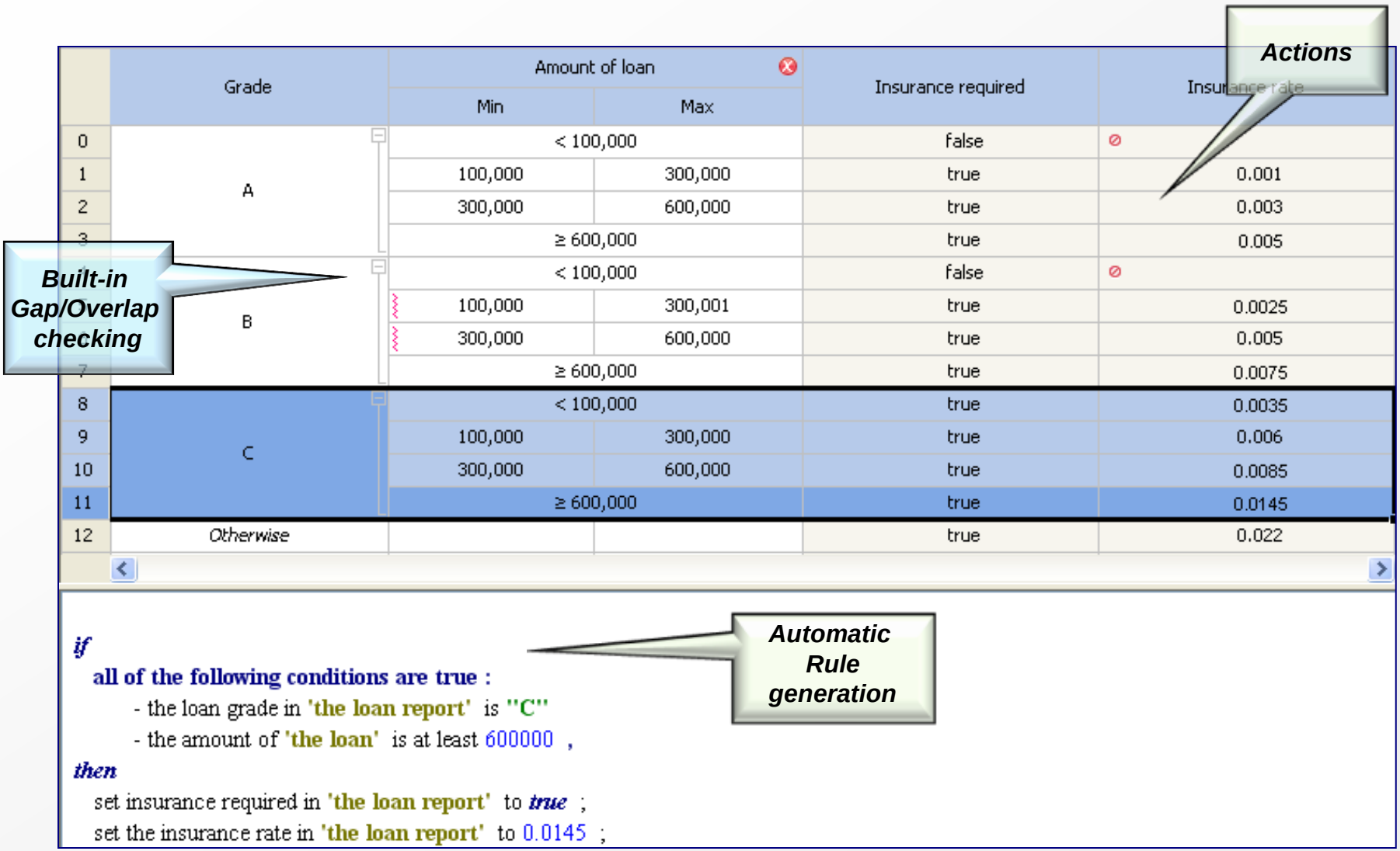
- Business environment (Decision Center)

Deploy

- Rules and events projects to their respective execution environments



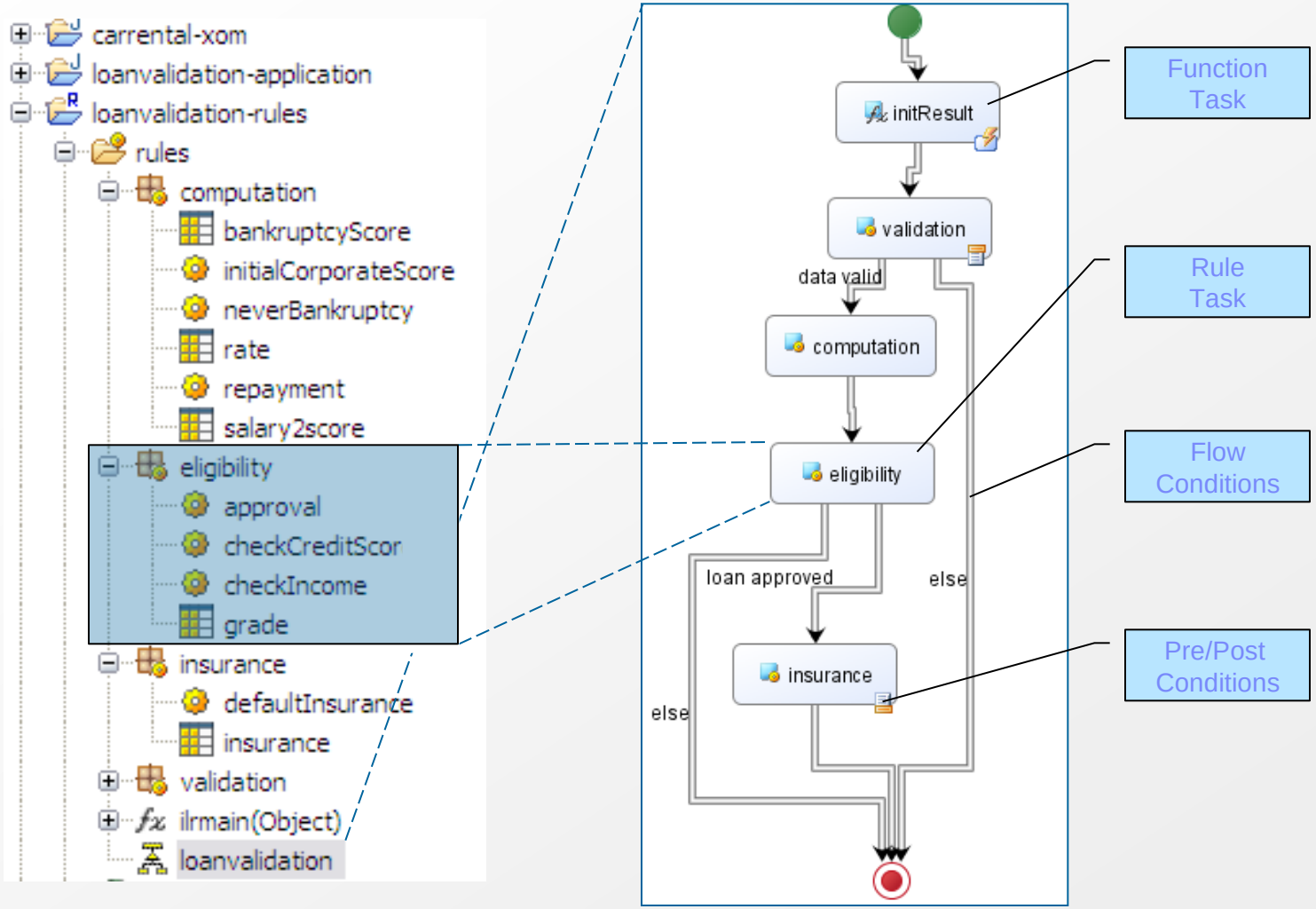
Decision Tables



	Grade	Amount of loan		Insurance required	Insurance rate
		Min	Max		
0	A	< 100,000		false	⊘
1		100,000	300,000	true	0.001
2		300,000	600,000	true	0.003
3		≥ 600,000		true	0.005
4	B	< 100,000		false	⊘
5		100,000	300,001	true	0.0025
6		300,000	600,000	true	0.005
7		≥ 600,000		true	0.0075
8	C	< 100,000		true	0.0035
9		100,000	300,000	true	0.006
10		300,000	600,000	true	0.0085
11		≥ 600,000		true	0.0145
12	*Otherwise*			true	0.022

```
if
   all of the following conditions are true :
        - the loan grade in 'the loan report' is "C"
        - the amount of 'the loan' is at least 600000 ,
then
   set insurance required in 'the loan report' to true ;
   set the insurance rate in 'the loan report' to 0.0145 ;
```

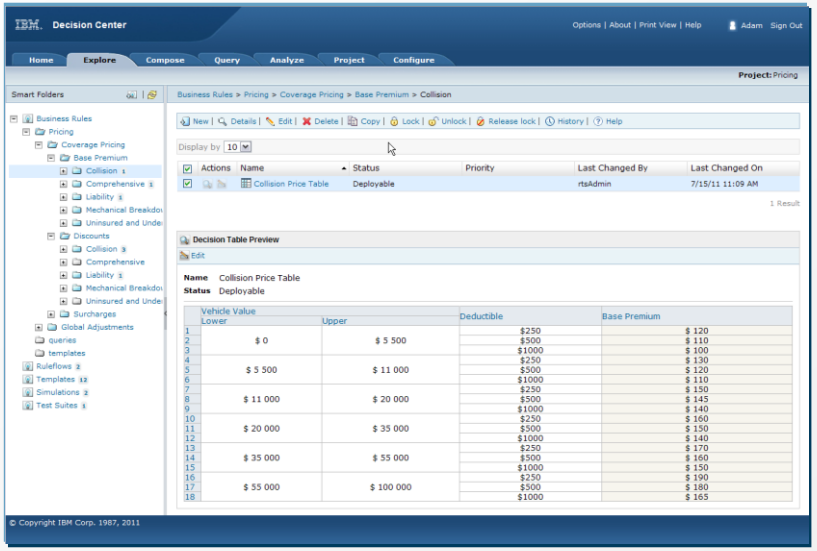
Rule Authoring: Visual Decision Flow

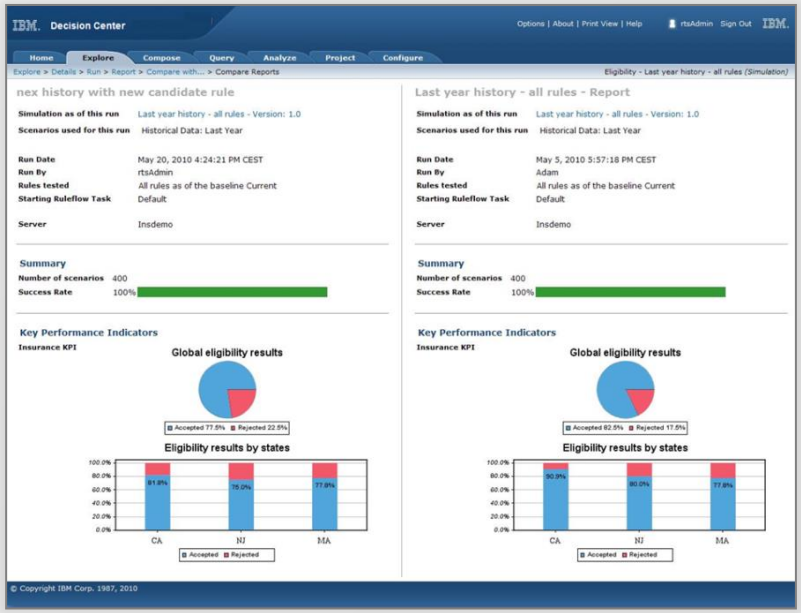


Decision Center - Enterprise Console

Web-based Event and Rule Maintenance

- Access rule artifacts concurrently without conflict or delay
- Represent complex policies using rule overrides and hierarchies
- Take control of very large rulebases with Smart Views, easy search and reporting
- Get automatic notification of potential rule conflicts, redundancies
- See where rules are used across projects using queries
- Hot-deploy rule and event changes in minutes
- Secure, integrated with enterprise security facility including single sign-on
- Multiple release management supporting diff and merge

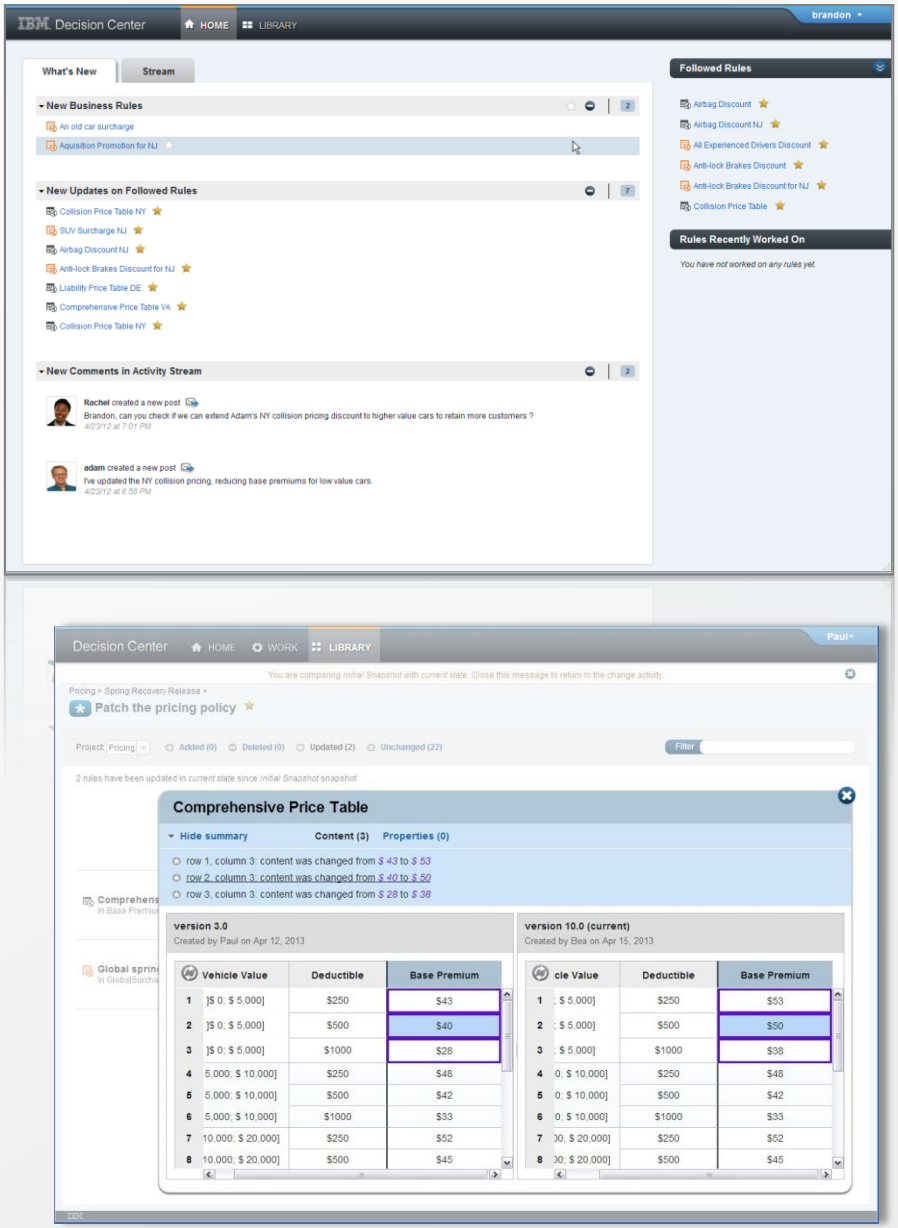




Decision Center – Business Console

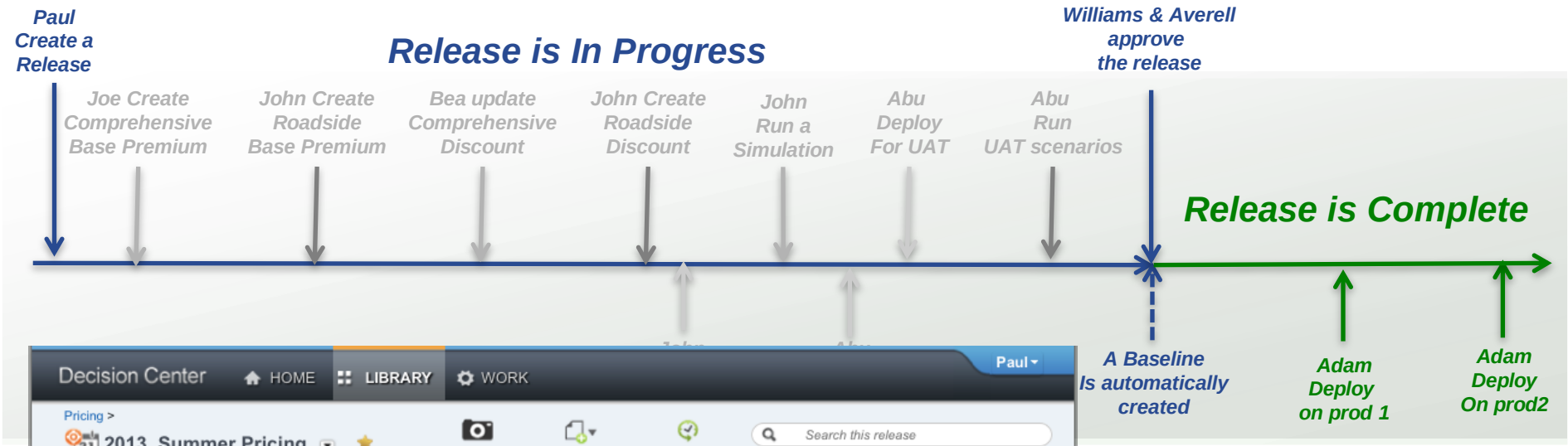
Social Medial Style Collaboration

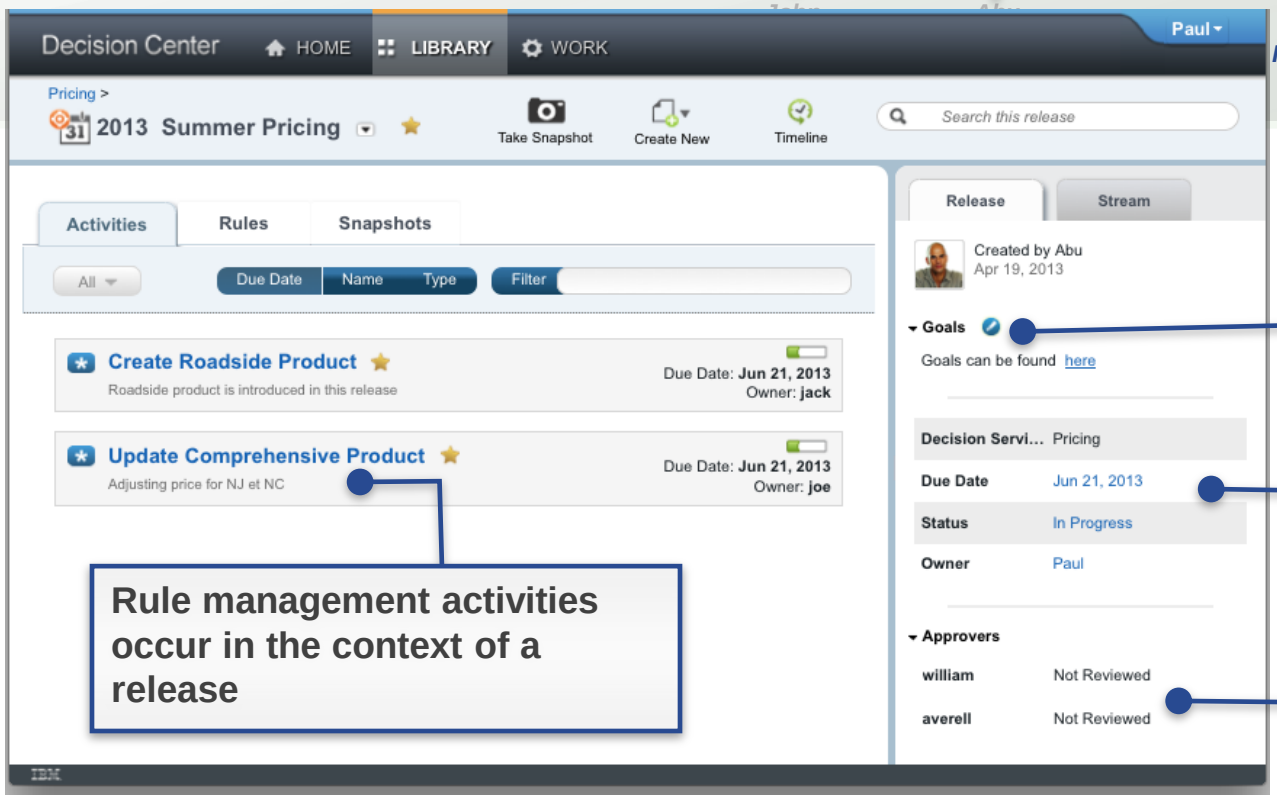
- Built-in Decision Governance Framework methodology
- Maintain awareness across the team
- Ensure automatic notifications of changes
- Ensure team collaboration



Decision Governance Framework

All Changes and Deployments Relate to a Specific Release





Rule management activities occur in the context of a release

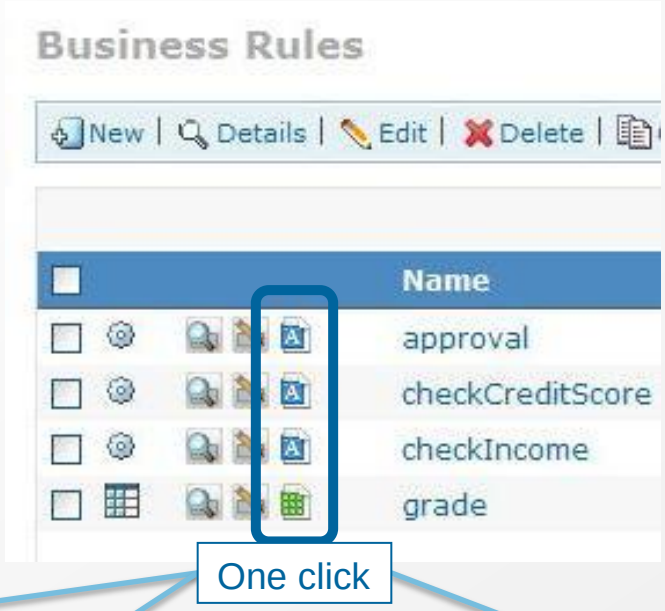
Release objectives are documented

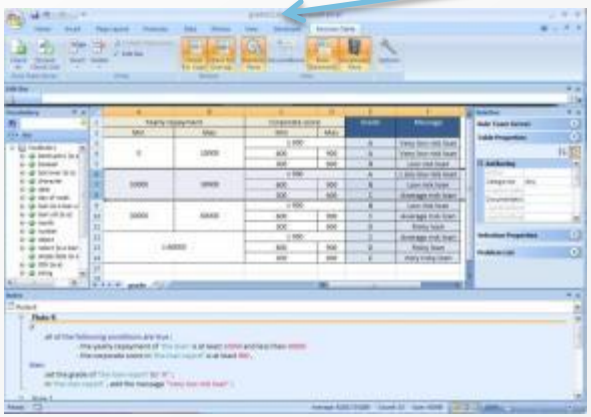
Release has
- A due date
- A status
- An owner

To complete, a Release must be reviewed and approved

Extended Rule Authoring Experience

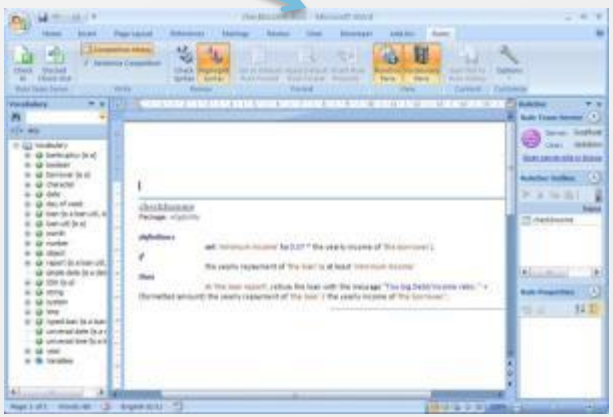
- Direct access to MS editing
- Ruleflow editing thru Word
- Automatic synchronization
- Automatic lock of edited elements





Decision Table in MS Excel

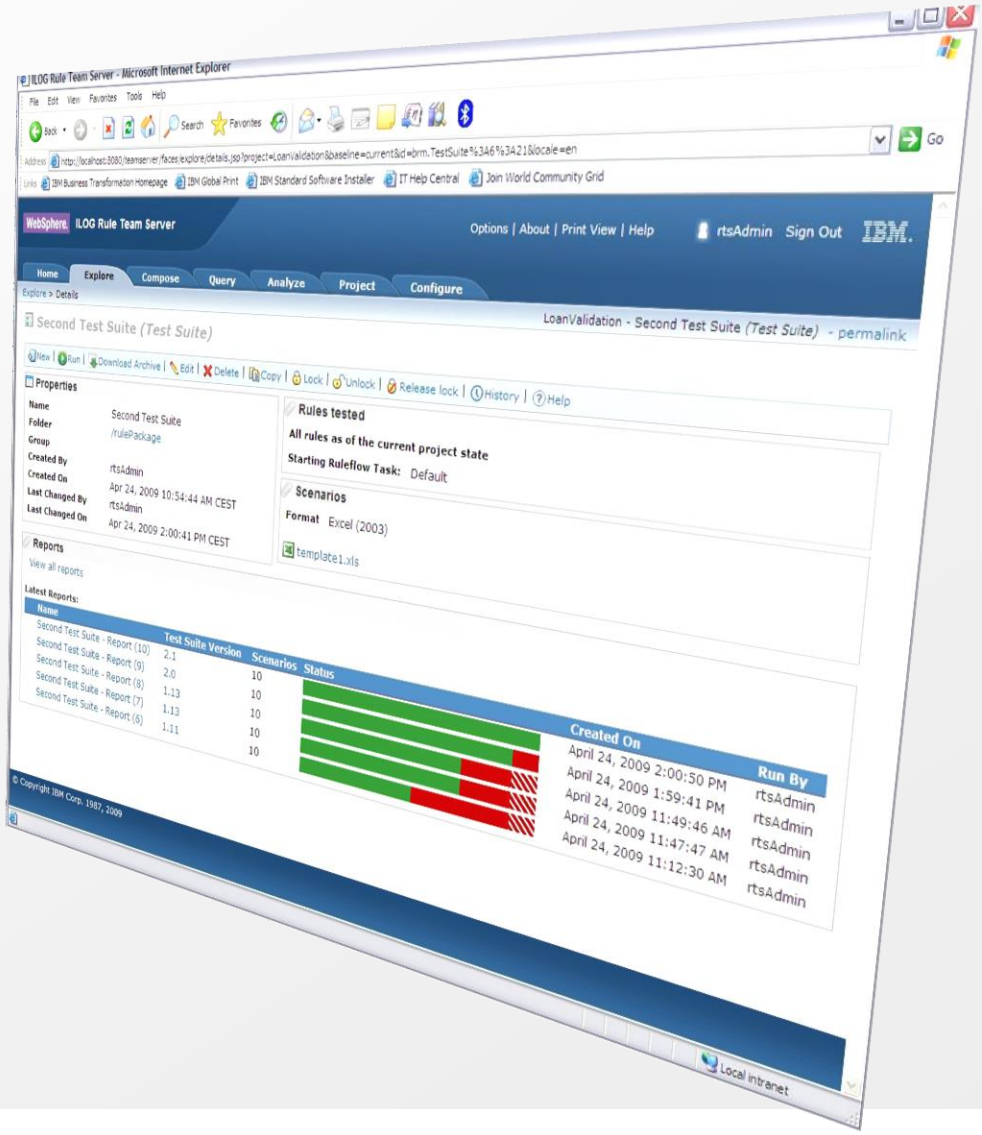
Rule Flow in MS Word



Action rules in MS Word

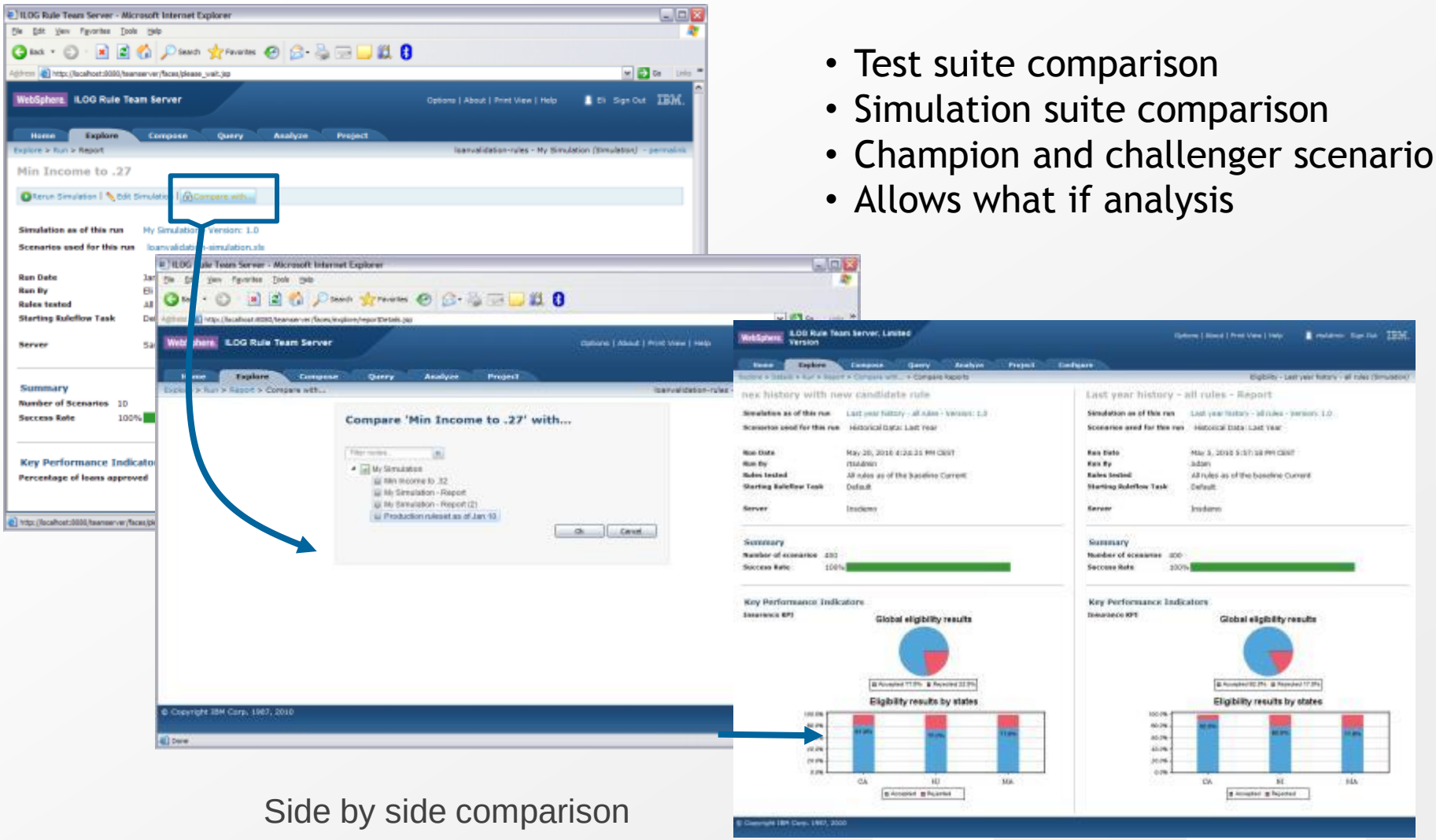
Testing and Simulation

- The feature formally know as Decision Validation Services
- Functionality Overview
  - Out-of-the-box ruleset testing in Decision Center
  - Business impact simulation in Decision Center
  - Scenario configuration and customization in Rule Studio
  - Audit - Decision Warehouse in Rule Execution Server



Simulation Capabilities

- Test suite comparison
- Simulation suite comparison
- Champion and challenger scenario
- Allows what if analysis



Side by side comparison

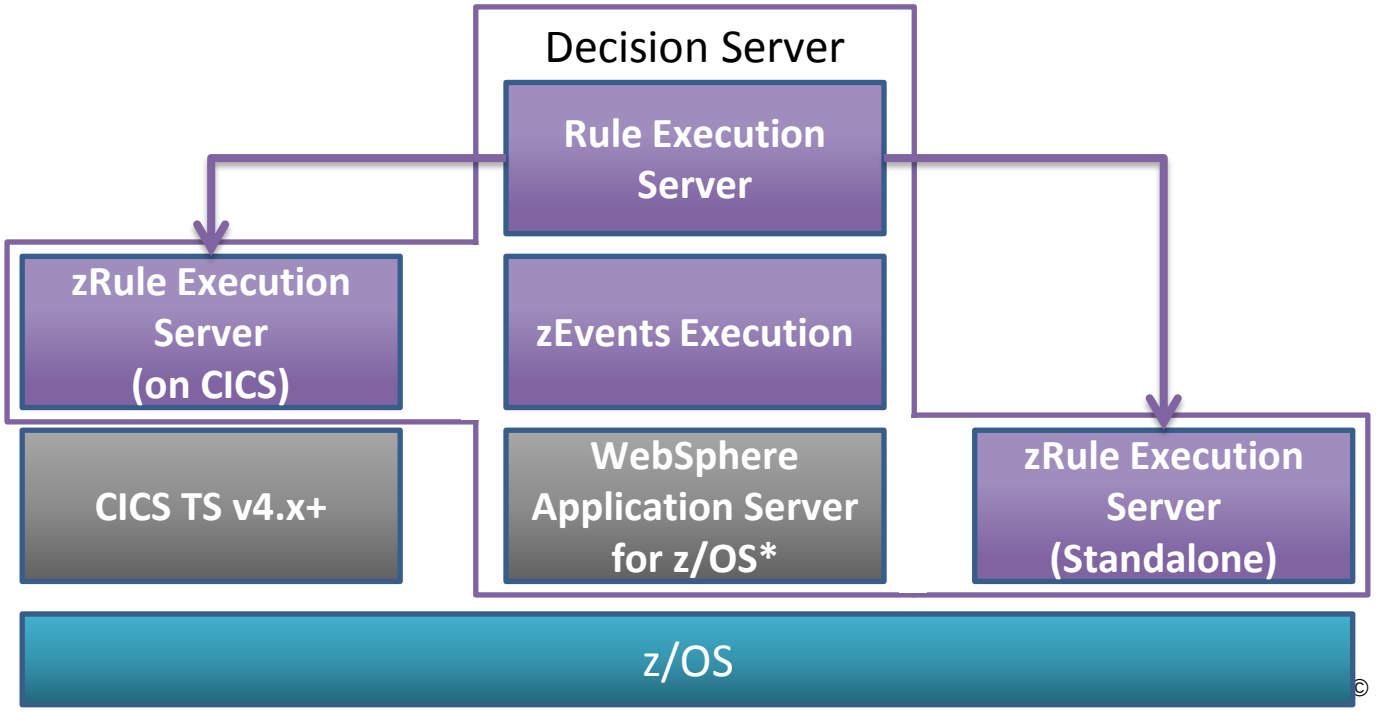
Today

Tomorrow

Rule Execution Server Options on z/OS

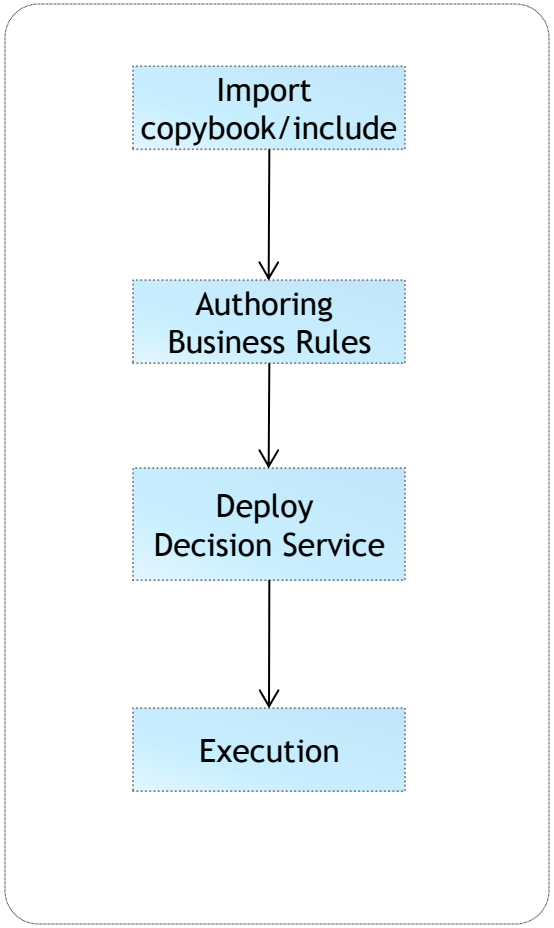
Decision Server Runtime Options

- Decisions can be invoked from existing CICS, batch and IMS applications
- Runtime support for COBOL and PL/I data types
- Flexible runtime deployment to fit any z/OS environment:
  - Deployed on WebSphere Application Server for z/OS
  - Deployed standalone to z/OS
  - Deployed in CICS TS 4.2 and above JVMServer environment



* limited use entitlement included with Decision Server

Starting from a COBOL copybook or PL/I Include



Scenario

- Existing application containing business rules
- Data model defined in COBOL copybook or PL/I Include file
- Use ODM to modernize the business policy

Benefits

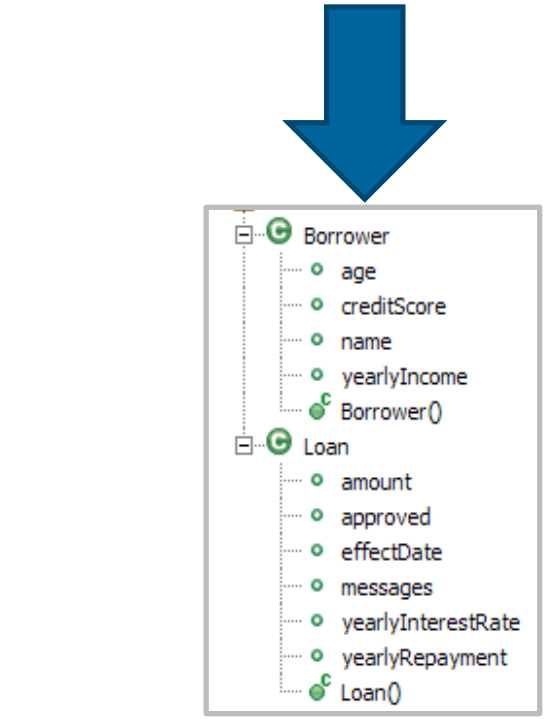
- Modernize business policies in ODM
- Rules can be invoked ‘naturally’ from existing application
- Business policy/rule lifecycle detached from application lifecycle

Note: The PL/I Include to XOM tooling is not available until V8.5

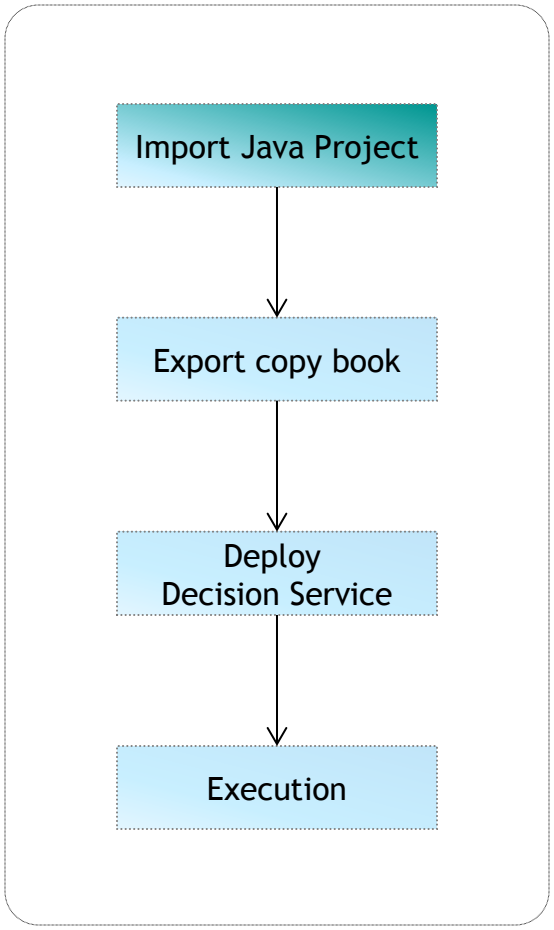
Rule Authoring COBOL & PL/I -> XOM

- Support Enterprise COBOL & PL/I
- Java is created from the copybook or include structure
  - Java XOM & Java code to marshal between COBOL or PL/I <-> Java
  - 01 level structures mapped to class in BOM
- Redefines statements supported
  - Select which redefines structure to import

```
01  Borrower.
    05  name                 PIC  X(20).
    05  creditScore          PIC  S9(10).
    05  yearlyIncome         PIC  9(10).
    05  age                  PIC  9(3).
01  Loan.
    05  amount               PIC  9(10).
    05  yearlyInterestRate   PIC  99.
    05  yearlyRepayment      PIC  9(10).
    05  effectDate           PIC  X(8).
    05  approved             PIC  X.
    05  messageCount         PIC  9(2).
    05  messages             PIC X(60)
                             OCCURS 0 TO 99 TIMES
                             DEPENDING ON messageCount.
```



Starting With an Existing Java Project



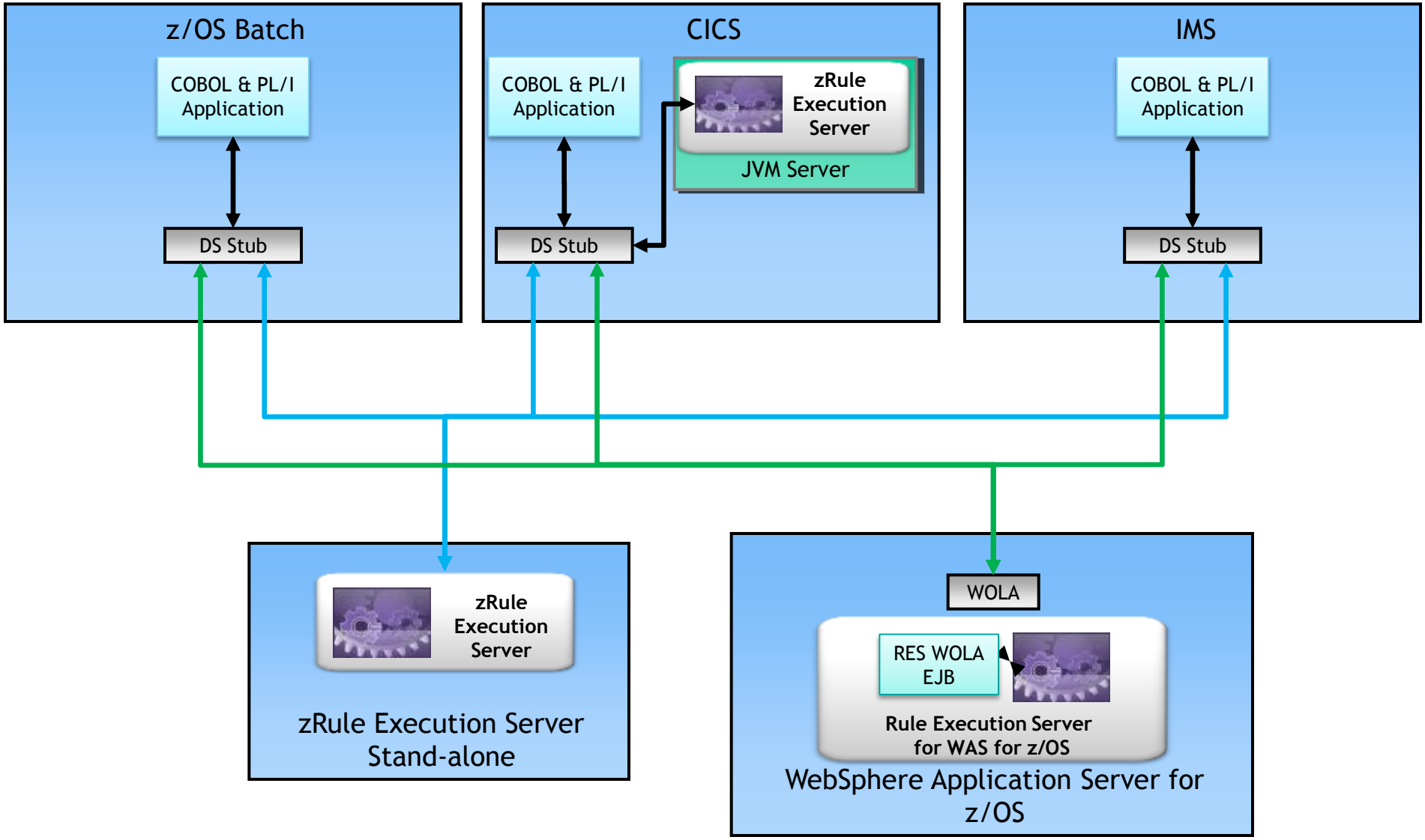
Scenario

- Existing Rule projects exist that are currently in use on distributed platforms
- Concurrent execution of rules required on z/OS from COBOL applications

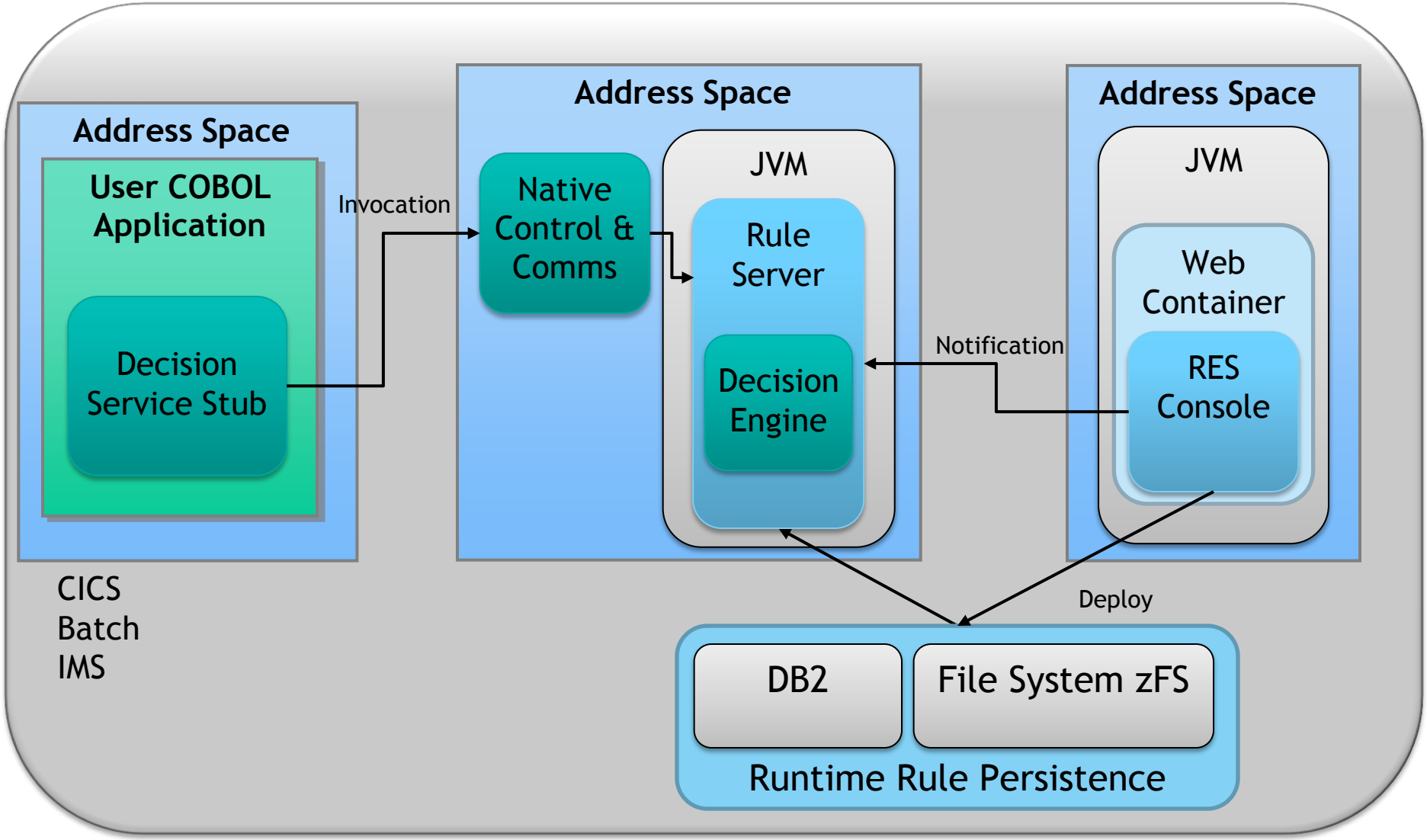
Benefits

- Consistent decision rules where ever executed
- Rules can be invoked ‘naturally’ from existing applications on all platforms
- Enables central rule management across System z and distributed execution
- Business policy/rule lifecycle detached from application lifecycle

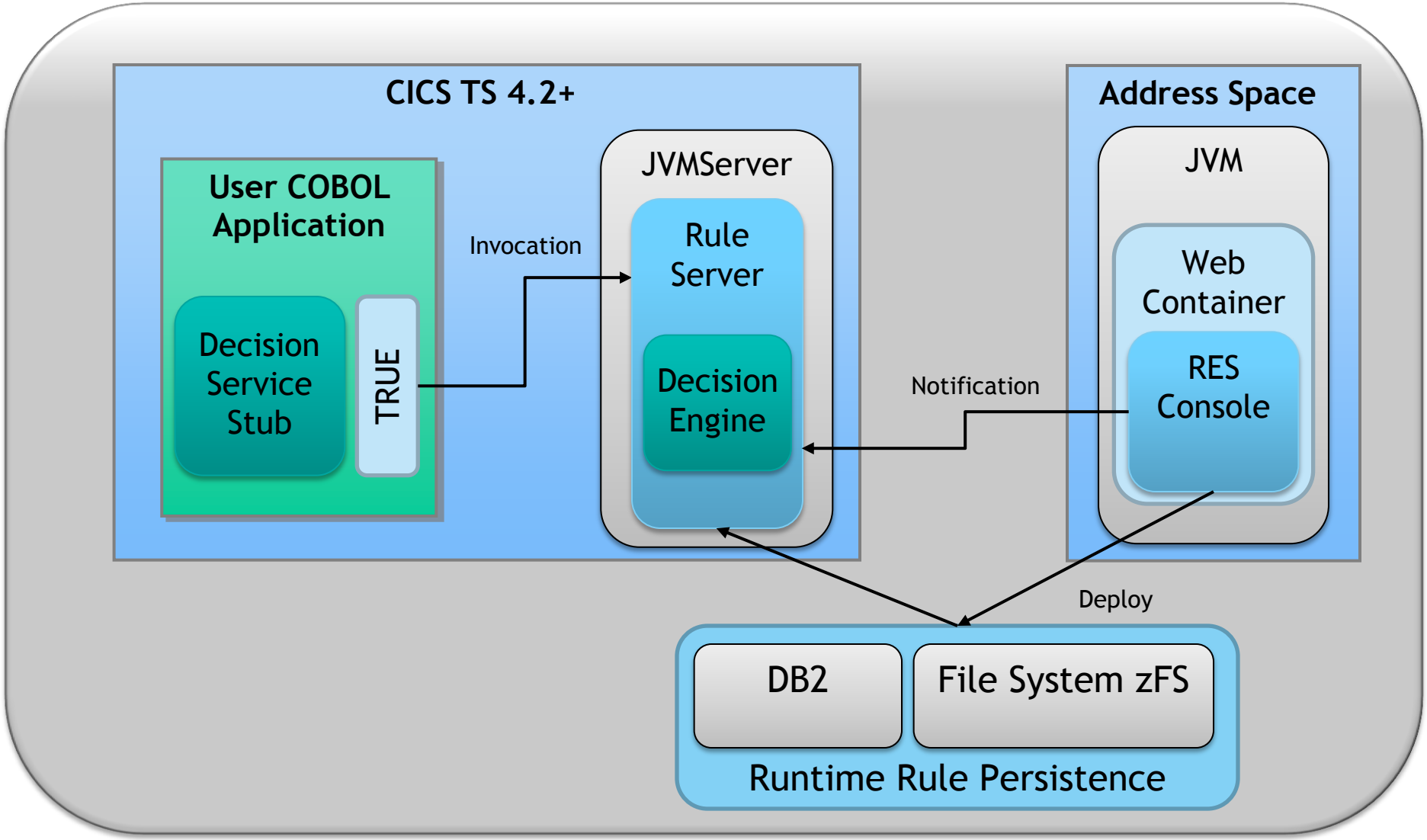
Decision Invocation Options on z/OS



zRule Execution Server – Stand Alone

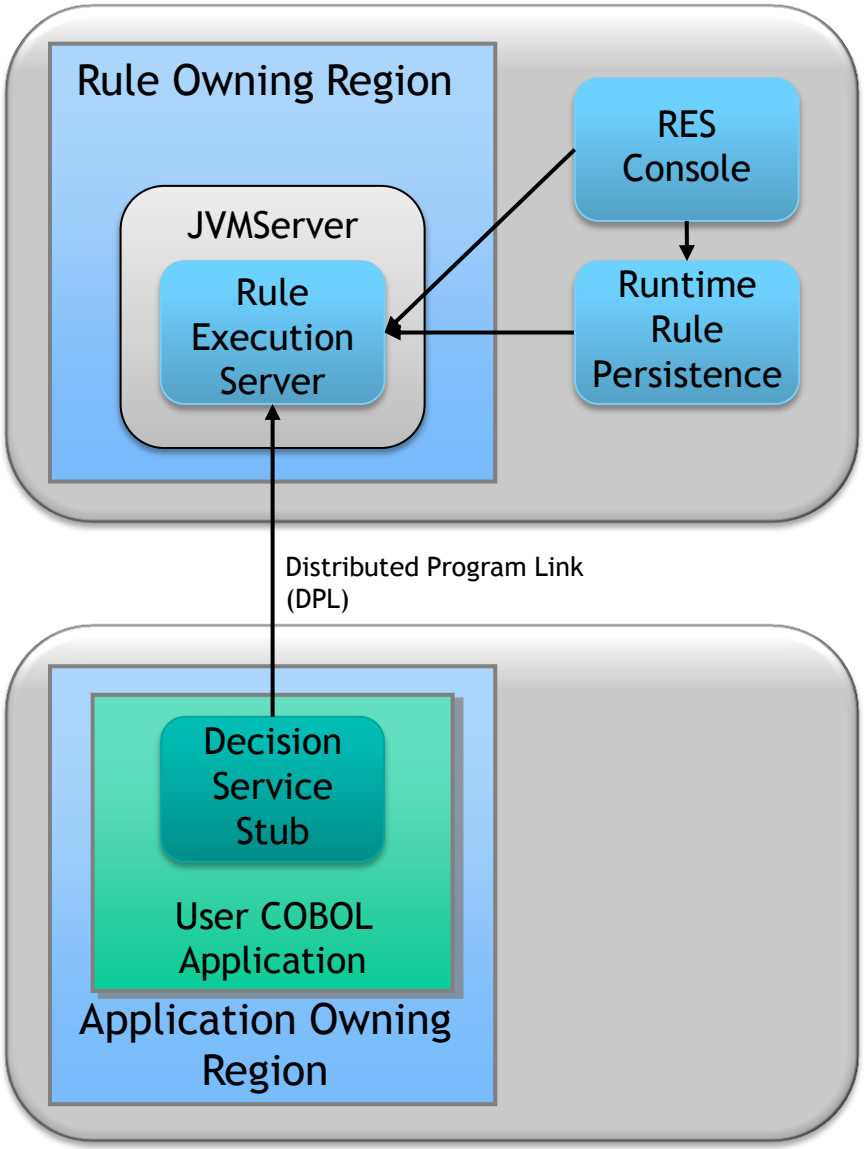


zRule Execution Server for z/OS – CICS 4.2 & 5.1

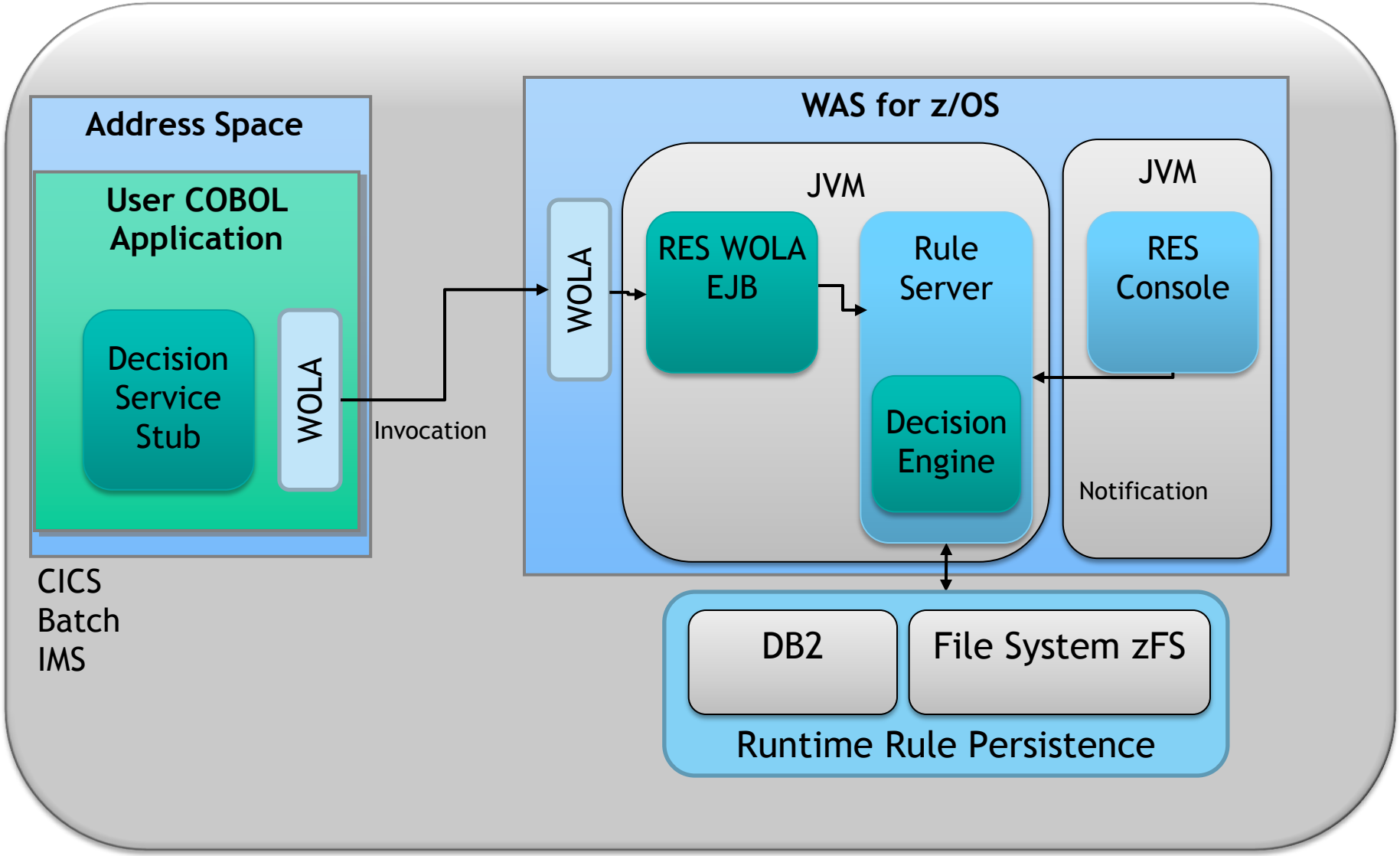


CICS Rule-Owning Regions (ROR)

- A CICS rule-owning region allows centrally hosted rules to be called by multiple CICS regions
- The rule-owning region hosts a zRule Execution Server for z/OS instance that runs locally in the CICS JVM server.
- The application-owning region uses a CICS Distributed Program Link (DPL) to run rules in a rule-owning region
- CICS DPL supports the ability for CICS to work load balance by having multiple rule-owning regions



zRule Execution Server for z/OS for WAS on z/OS



New Decision Engine Support

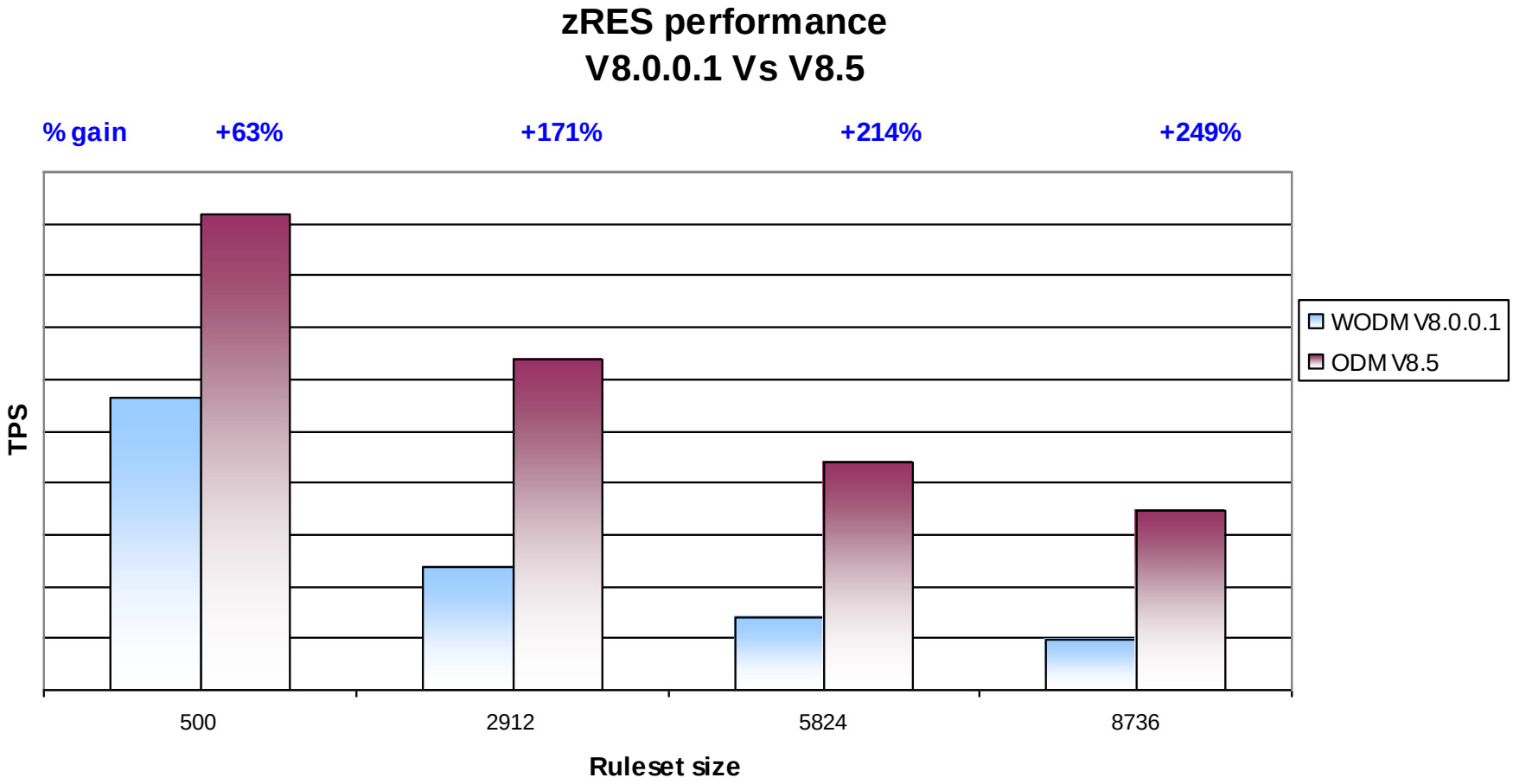
- **Increased Performance**
  - More transactions per seconds (up to +60% for very big projects)
  - Reduced ruleset loading time (up to 17 times)
- **Enhanced Scalability**
  - Ability to better leverage technical resources
  - Decisions can now involve thousands of rules with confidence and performance
- **Reduced Consumption**
  - Requires less memory even for big rulesets
  - Up to 30 times less memory required in very large decisions
- **Compatibility**
  - Decision Engine is compatible with existing rulesets
  - Classical rule engine remains the default execution engine

Disclaimer: All figures measured during IBM internal benchmarks made on June 2013 comparing v8.0 legacy engine with the new v8.5.1 Decision Engine installed on similar configurations. Figures are for information purpose only and are not contractual.

Decision Engine z/OS Performance Highlights

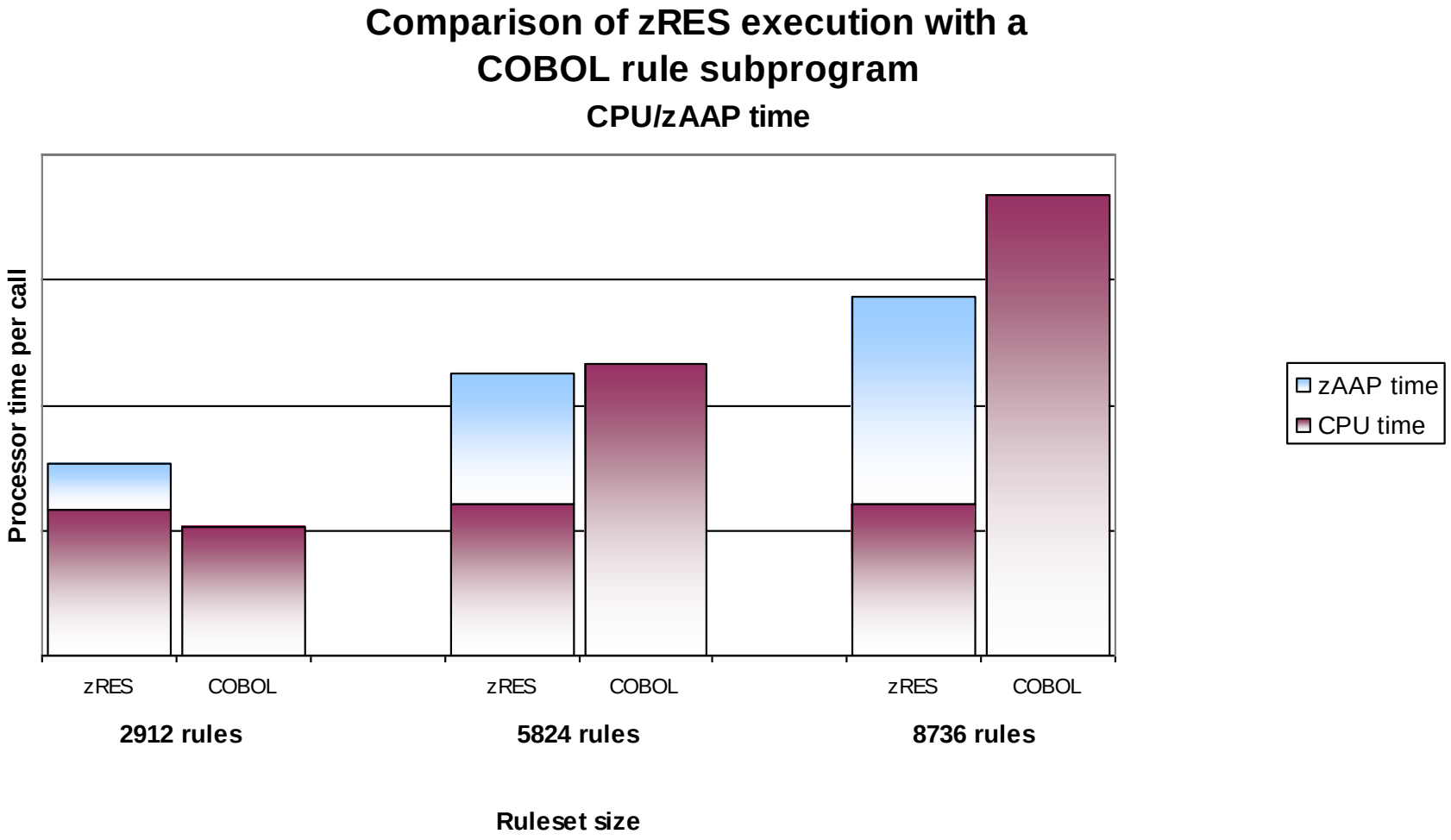
- zRES Stand Alone
  - The examples have shown throughput increased 103% - 348%
- zRES memory requirement significantly reduced
  - The examples have shown all performance benchmarks were able to run in 32MB heap
- zRES on CICS
  - The examples have shown throughput increased 25% - 253%
- In test runs we have achieved 27,424 rule invocations per second
  - 4 CPU EC12 (500 rule ruleset, using fastpath algorithm)

Decision Engine z/OS Performance Highlights



zAAP %	18	17	63	24	73	46	80	58

Decision Engine z/OS Performance Highlights



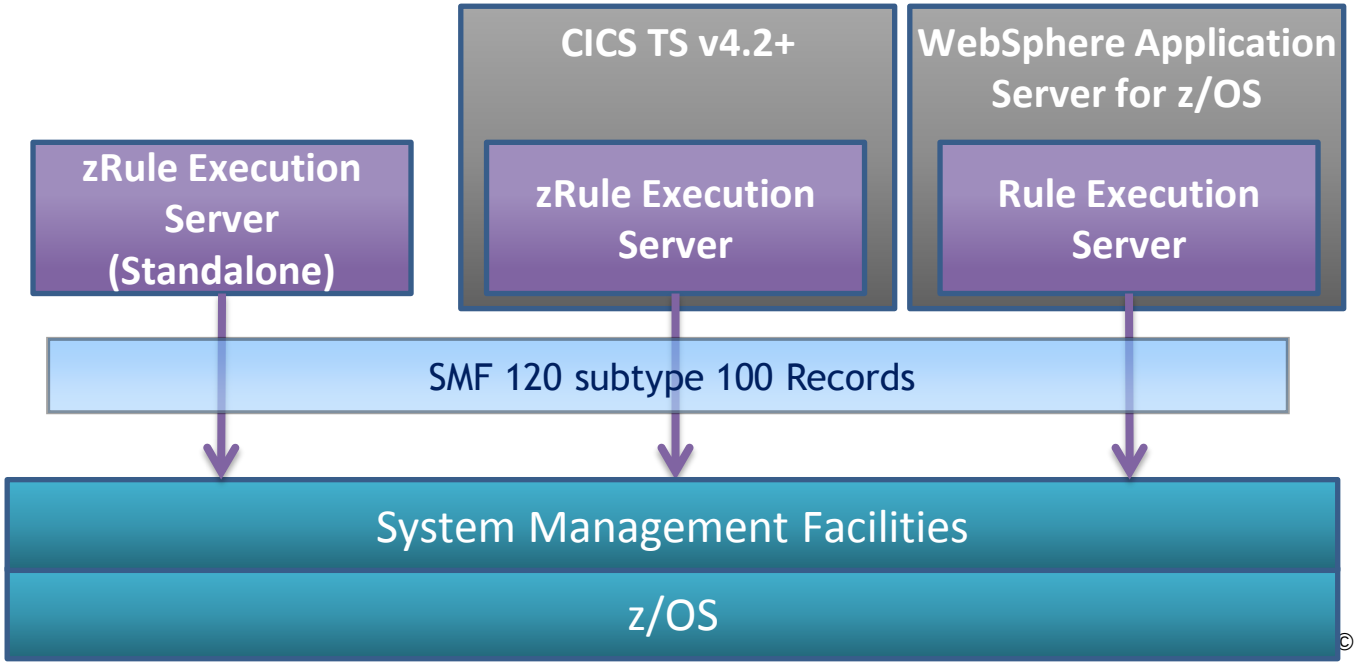
Decision Engine Feature Comparison

	Supported Features		
	Rule Classic Engine	Decision Engine v8.0.1	Decision Engine v8.5.1
Available for zRES stand alone and CICS deployments	✓	✓	✓
Available for RES in WebSphere AS for z/OS deployments	✓		✓
Develop Rule Projects in Rule Designer	✓	✓	✓
Testing and simulation support	✓	★	★
Support for Web Service invocation (HTDS & MTDS)	✓		✓
Integration with Decision Center business tooling	✓		✓
Build and deploy rulesets from Decision Center	✓		✓
Decision Warehousing rule auditing support	✓		✓
Remote and local debugging of ruleset execution	✓		✓
Full support for low level programming in native IRL	✓		

★ Testing converts ruleset back to Classic engine support.
Decision engine architected to give same results as Classic engine

Monitoring Decision Execution

- Decisions monitoring can be enabled all z/OS environments including:
  - zRule Execution Server stand alone deployments
  - zRule Execution Servers deployed in a CICS TS Environment
  - Rule Execution Servers deployed in a WebSphere Application Server for z/OS
- Usage records written as standard z/OS SMF 120 subtype 100 records
- Can be used to track
  - Number of times a particular decision is invoked
  - Total number of rules fired for a particular decision



ODM execution data – SMF 120 Subtype 100 structure

- Each record contains
  - Standard SMF Header
  - ODM Header
  - Zero to many Execution Segments Records
- Execution segment record contains data collected for each decision defined by a unique ruleset path
  - E.g. /MiniLoanDemoRuleApp/1.0/MiniLoanDemo/2.0

- The SMF record structures are provided as a sample with ODM 8.5.1
  - ++HBRHLQ++.SHBRXLCH(HBRSMF)

Execution Segment Layout

- One segment is created for each unique ruleset path
  - Decision must have been invoked during the interval
- Contains
  - The unique ruleset path that identifies the decision
  - The number of times the decision has been successfully invoked
  - The number of times the decision has been invoked but execution has failed
  - The sum of the rules fired for this decision

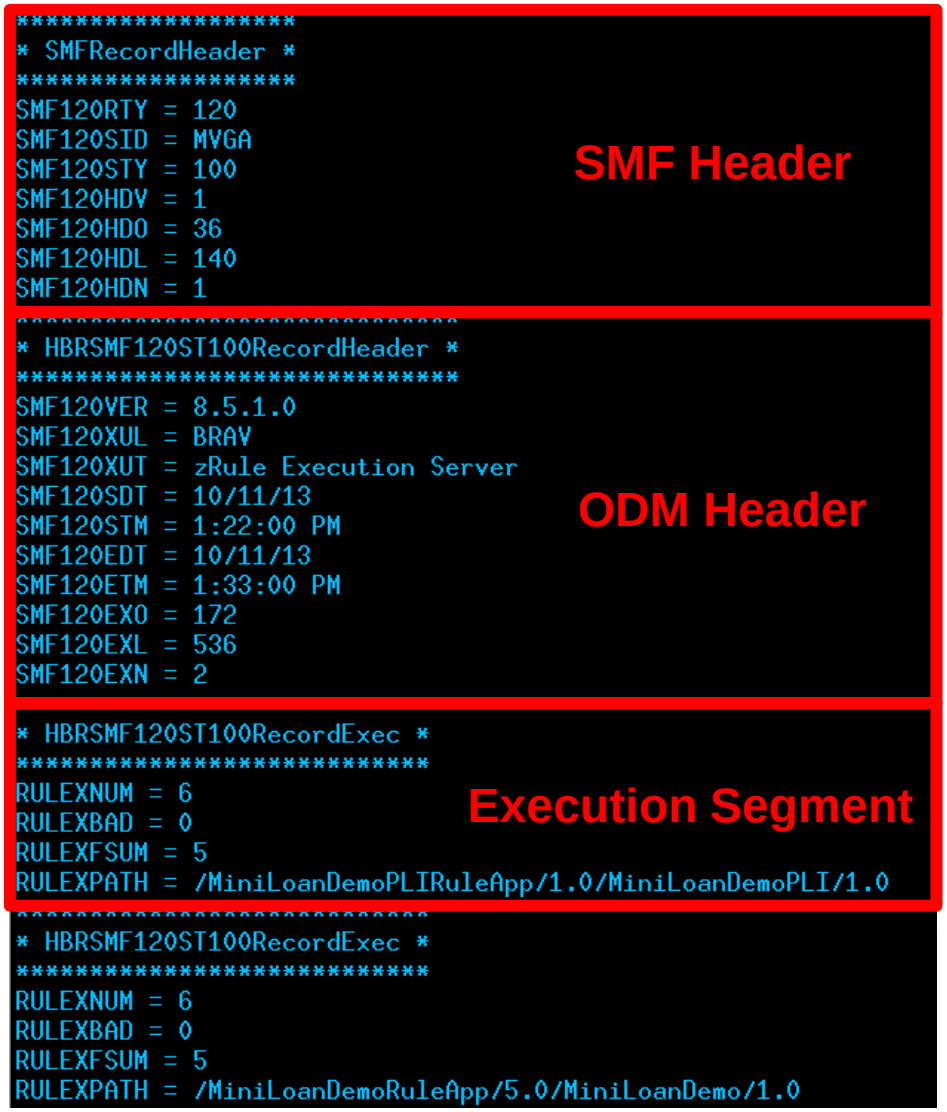
```
typedef struct {
    uint32_t RULEXNUM;   /* Ruleset successful execution count  */
    uint32_t RULEXBAD;   /* Ruleset failed execution count      */
    uint32_t RULEXFSUM;  /* Ruleset sum of fired rules          */
    char RULEXPATH[256]; /* Ruleset execution path              */
} HBRSMF120ST100RecordExec;
```

Printing ODM Execution Data

- ODM 8.5.1 provides a sample utility for printing the SMF 120 subtype 100 records

- Sample source for the utility
  - ++HBRHLQ++.SHBRXLCS(HBRSMFP)
  - ++HBRHLQ++.SHBRXLCH(HBRSMF)

- Sample JCL to run the utility
  - ++HBRHLQ++.SHBRJCL(HBRSMFP)



zRES API

* Connect to Execution Region

```
call 'HBRCONN'
  using HBRA-CONN-AREA
```

* Populate Header with parameter data

* Connect to Execution Server

```
call 'HBRRULE'
  using HBRA-CONN-AREA
IF HBRA-CONN-COMPLETION-CODE = HBR-CC-
OK
THEN
  . . .
```

* Disconnect from Execution Region

```
call 'HBRDISC'
  using HBRA-CONN-AREA
```

```
01 HBRA-CONN-AREA.
  10 HBRA-CONN-EYE              PIC X(4)  VALUE 'HBRC'.
  10 HBRA-CONN-LENTH            PIC S9(8) COMP.
  10 HBRA-CONN-VERSION          PIC S9(8) COMP  VALUE +2.
  10 HBRA-CONN-RETURN-CODES.
    15 HBRA-CONN-COMPLETION-CODE PIC S9(8) COMP.
    15 HBRA-CONN-REASON-CODE    PIC S9(8) COMP.
  10 HBRA-CONN-FLAGS            PIC S9(8) COMP  VALUE +1.
  10 HBRA-CONN-INSTANCE         PIC X(24).
  10 HBRA-CONN-RULE-COUNT       PIC S9(8) COMP.
  10 HBRA-CONN-RULE-MAJOR-VERSION PIC S9(8) COMP.
  10 HBRA-CONN-RULE-MINOR-VERSION PIC S9(8) COMP.
  10 HBRA-CONN-RULEAPP-NAME     PIC X(256).
  10 HBRA-RESPONSE-AREA.
    15 HBRA-RESPONSE-MESSAGE    PIC X(512).
  10 HBRA-RA-PARMETERS.
    15 HBRA-RA-PARMS  OCCURS 32.
      20 HBRA-RA-PARAMETER-NAME  PIC X(48).
      20 HBRA-RA-DATA-ADDRESS    USAGE POINTER.
      20 HBRA-RA-DATA-LENGTH     PIC 9(8) BINARY.
  10 HBRA-RESERVED.
    15 HBRA-RESERVED02           PIC X(12).
    15 HBRA-RESERVED03           PIC X(64).
    15 HBRA-RESERVED04           PIC X(64).
    15 HBRA-RESERVED05           PIC X(128).
    15 HBRA-RESERVED06           PIC X(128).
```

zRES API Within a Program

```
Line 33      Column 12    Insert   139 changes
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--
      IDENTIFICATION DIVISION.
      PROGRAM-ID. HBRMINC.
      ...

      WORKING-STORAGE SECTION.
      ...
     * Parameter Data
      COPY MINILOAN.
     * Return Code definitions
      COPY HBRC.
     * HBR Header structure
      COPY HBRWS.
      ...

      PROCEDURE DIVISION.

     * Connect to zRES
          call 'HBRCONN' using HBRA-CONN-AREA

          IF HBRA-CONN-COMPLETION-CODE NOT EQUAL HBR-CC-OK THEN
              perform unFailedCall
          END-IF

     * Initialize call parameters
          MOVE ALL SPACES TO Borrower Loan
          MOVE ALL LOW-VALUES TO HBRA-RA-PARMETERS
          MOVE "/zRulesMiniLoanDemoRuleApp/zRulesMiniLoanDemo" TO
                       HBRA-CONN-RULEAPP-NAME

          move LENGTH OF Borrower to HBRA-RA-DATA-LENGTH(1)
          move "borrower"         to  HBRA-RA-PARAMETER-NAME(1)
          set HBRA-RA-DATA-ADDRESS(1) to address of Borrower

          move LENGTH OF Loan         to HBRA-RA-DATA-LENGTH(2)
          multiply length of messages by 10 giving WS-maxMessageLen
          add WS-maxMessageLen to HBRA-RA-DATA-LENGTH(2)
          move "loan"                 to HBRA-RA-PARAMETER-NAME(2)
          set HBRA-RA-DATA-ADDRESS(2) to address of Loan

          move 'F' to approved
```

```
Line 81      Column 12    Insert   144 changes
----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7--
     * Read scenario data
          MOVE ALL LOW-VALUES TO WS-IN
          UNSTRING SCENARIO-DATA DELIMITED BY ','
                   INTO
              WS-IN-data(1) WS-IN-data(2) WS-IN-data(3)
              WS-IN-data(4) WS-IN-data(5) WS-IN-data(6)
     * Populate the borrower from scenario data
          move WS-IN-data(1) to name
          Compute creditscore        = Function numval(WS-IN-data(2))
          Compute yearlyIncome       = Function numval(WS-IN-data(3))
     * Populate the loan from scenario data
          Compute amount             = Function numval(WS-IN-data(4))
          Compute yearlyRepayment    = Function numval(WS-IN-data(5))
          Compute yearlyInterestRate = Function numval(WS-IN-data(6))

     * Invoke the rule
          call 'HBRRULE' using HBRA-CONN-AREA

          EXEC CICS SUSPEND END-EXEC

     * Display rule responses, or error code, as appropriate
          if HBRA-CONN-COMPLETION-CODE = HBR-CC-OK then
              display 'HBR CALL Sucessful'

     * Disconnect
          call 'HBRDISC' using HBRA-CONN-AREA

          IF HBRA-CONN-COMPLETION-CODE NOT EQUAL HBR-CC-OK THEN
              perform unFailedCall
          END-IF

          perform prtDemoText

          EXEC CICS RETURN END-EXEC
          GOBACK.
```

Rule Execution Server Deployment Options

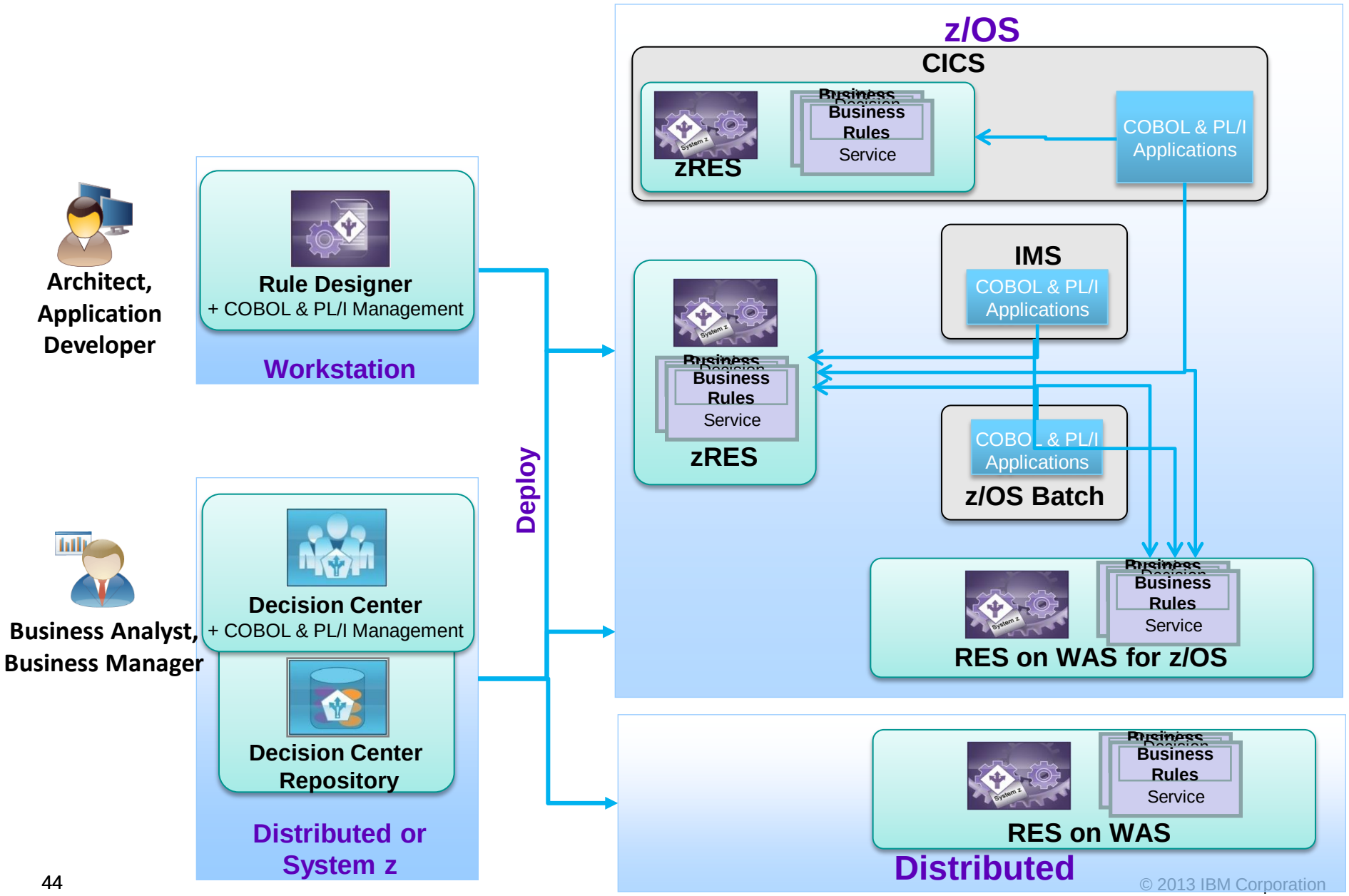
✓ Since v7.5

✓ New in v 8.0

✓ New in v 8.5

	zRule Execution Server deployed in WebSphere Application Server for z/OS	zRule Execution Server deployed as a Standalone environment	zRule Execution Server deployed in CICS TS v4.x JVMServer environment
Full support for all rule authoring constructs	✓	✓	✓
Hot deployment support for new decision versions	✓	✓	✓
Integration with Decision Center business tooling	✓	✓	✓
Testing and simulation support	✓	✓	✓
Decision Warehousing rule auditing support	✓	✓	✓
Easy sharing of rules with distributed deployments	✓	✓	✓
Local execution support for CICS TS v4.x			✓
Full HA & transactional support	✓		✓
Support for new optimized Decision Engine	✓	✓	✓

Decision Management: Comprehensive Flexibility



ODM for z/OS enables smart organizations to capitalize on modernization and innovation

- Faster Time to Market:
  - Ability to react to changes in a fast pace competitive marketplace though Business events and rules
- Lower cost of maintenance
  - Leading to improvement operational efficiency and total cost of ownership
- Better visibility and control
  - Leading to improvement to better corporate governance
- Ability to implement the best rules for the best outcome
  - Business users can see, understand and have the appropriate tools to support the needs of the organization by maximizing their IT investment
- Ability to manage and document business decisions executed in System z applications
  - Authoring rules for COBOL & PL/I applications in business terminology
  - Ability to share business rules with Java and other COBOL & PL/I applications
  - Integrate seamlessly with existing COBOL & PL/I applications

Where can I find out more?

- http://www.ibm.com/operational-decision-management
  - Shortcut: http://ibm.com/ibmodm
  - IBM Operational Decision Manager for z/OS
- White papers & tech docs
  - WebSphere z/OS – The Value of Co-Location
  - Brief introduction to WebSphere Optimized Local Adapters
  - WebSphere for System z Prescriptive Use Cases (Oct. 28, 2011 Addendum)
- Redbooks
  - Flexible Decision Automation for Your zEnterprise with Business Rules and Events
  - Batch Modernization on z/OS
  - Patterns: Integrating WebSphere ILOG JRules with IBM Software
- IBM Operational Decision Management YouTube demo
- Top 10 Business Use Cases for Operational Decision Management
- Good Decision! Decision Management blog

System z Social Media Channels

- **Top Facebook pages related to System z:**
  - IBM System z
  - IBM Academic Initiative System z
  - IBM Master the Mainframe Contest
  - IBM Destination z
  - Millennial Mainframer
  - IBM Smarter Computing

- **Top LinkedIn groups related to System z:**
  - System z Advocates
  - SAP on System z
  - IBM Mainframe- Unofficial Group
  - IBM System z Events
  - Mainframe Experts Network
  - System z Linux
  - Enterprise Systems
  - Mainframe Security Gurus

- **Twitter profiles related to System z:**
  - IBM System z
  - IBM System z Events
  - IBM DB2 on System z
  - Millennial Mainframer
  - Destination z
  - IBM Smarter Computing

- **YouTube accounts related to System z:**
  - IBM System z
  - Destination z
  - IBM Smarter Computing

- **Top System z blogs to check out:**
  - Mainframe Insights
  - Smarter Computing
  - Millennial Mainframer
  - Mainframe & Hybrid Computing
  - The Mainframe Blog
  - Mainframe Watch Belgium
  - Mainframe Update
  - Enterprise Systems Media Blog
  - Dancing Dinosaur
  - DB2 for z/OS
  - IBM Destination z
  - DB2utor

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