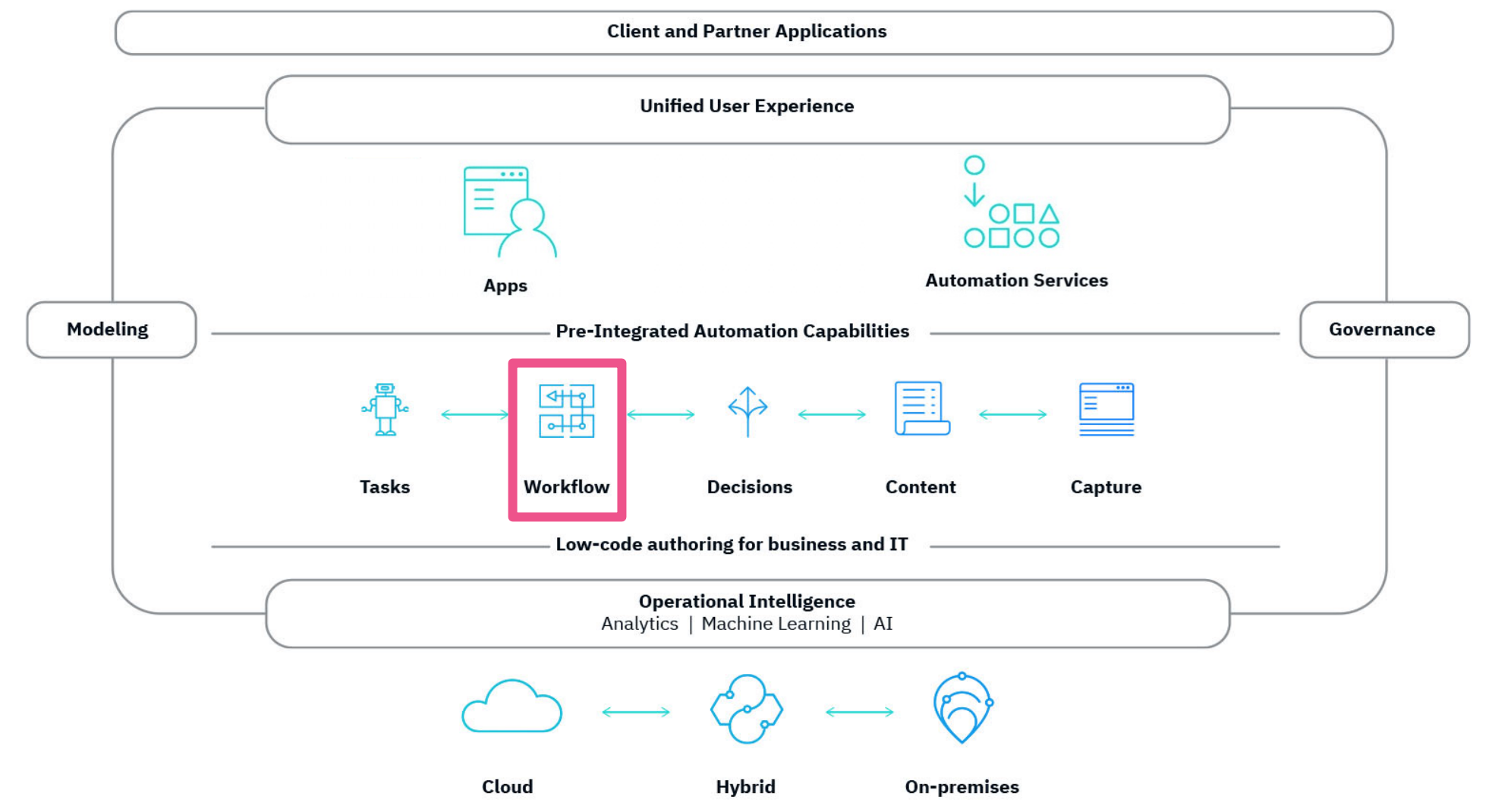
IBM Cloud Pak for Business Automation

- Business Automation Workflow
- Case Management
- Operational Decision Manager

Business Automation Workflow

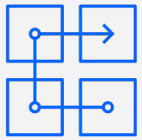
A Key Capability of the IBM Cloud Pak for Automation



Bringing together the capabilities of market-leading offerings

IBM Business Automation Workflow

IBM Case Manager + IBM Case Foundation + IBM Business Process Manager



Workflow

Workflow defines how work gets done through a sequence of steps performed by humans and systems.

Workflow management is the design, execution and monitoring of workflows.

Why IBM?

- Designed for process owners and business users to engage directly in the implementation
- Broad support for the smallest initial projects to enterprise-wide adoption

Design

- Graphical workflow designer
- Low-code design environment
- UI builder with rich palette of controls
- Reuse common components

Execution and monitoring

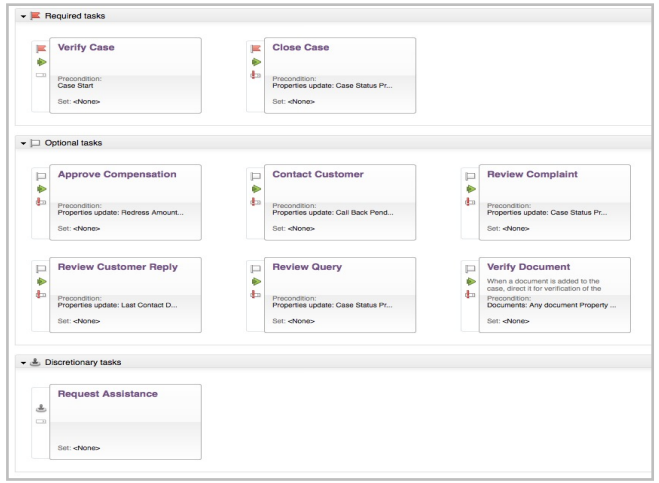
- Consolidated task management
- Flexible search and filtering
- Responsive, mobile ready UI
- Real time process metrics

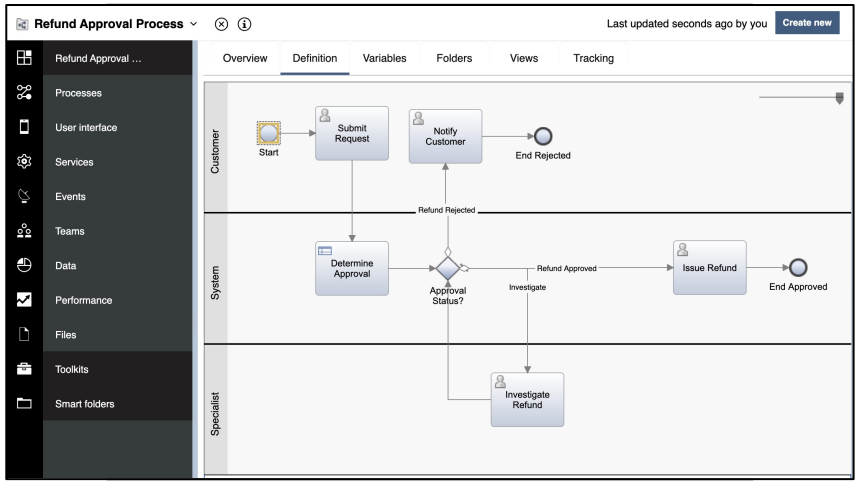
Governance and lifecycle management

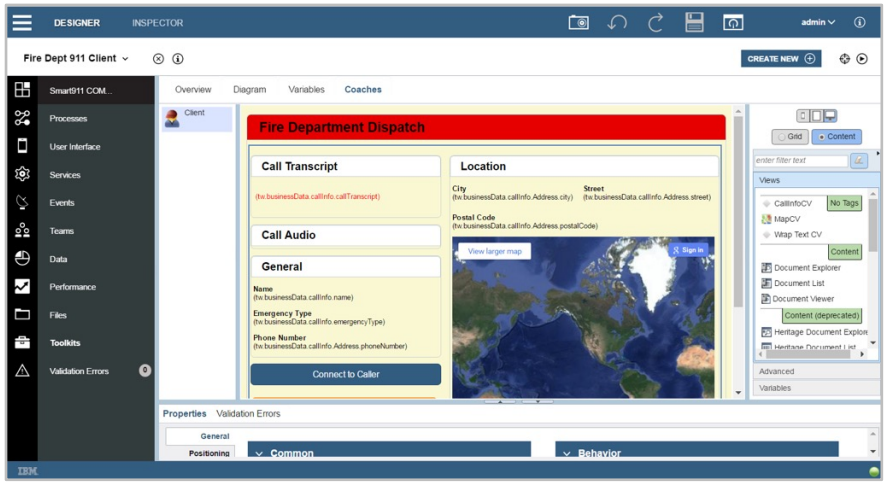
- Centrally managed development
- Built-in versioning and “one-click deployment”
- Manage hundreds of process applications across the enterprise

Workflow

Intuitive tools for workflow definition







Intuitive case designer

- Easily define the business level tasks needed
- Group tasks by required and optional steps

Graphical process layout

- “The picture is the process”
- Allows non-technical business users to configure their processes for execution

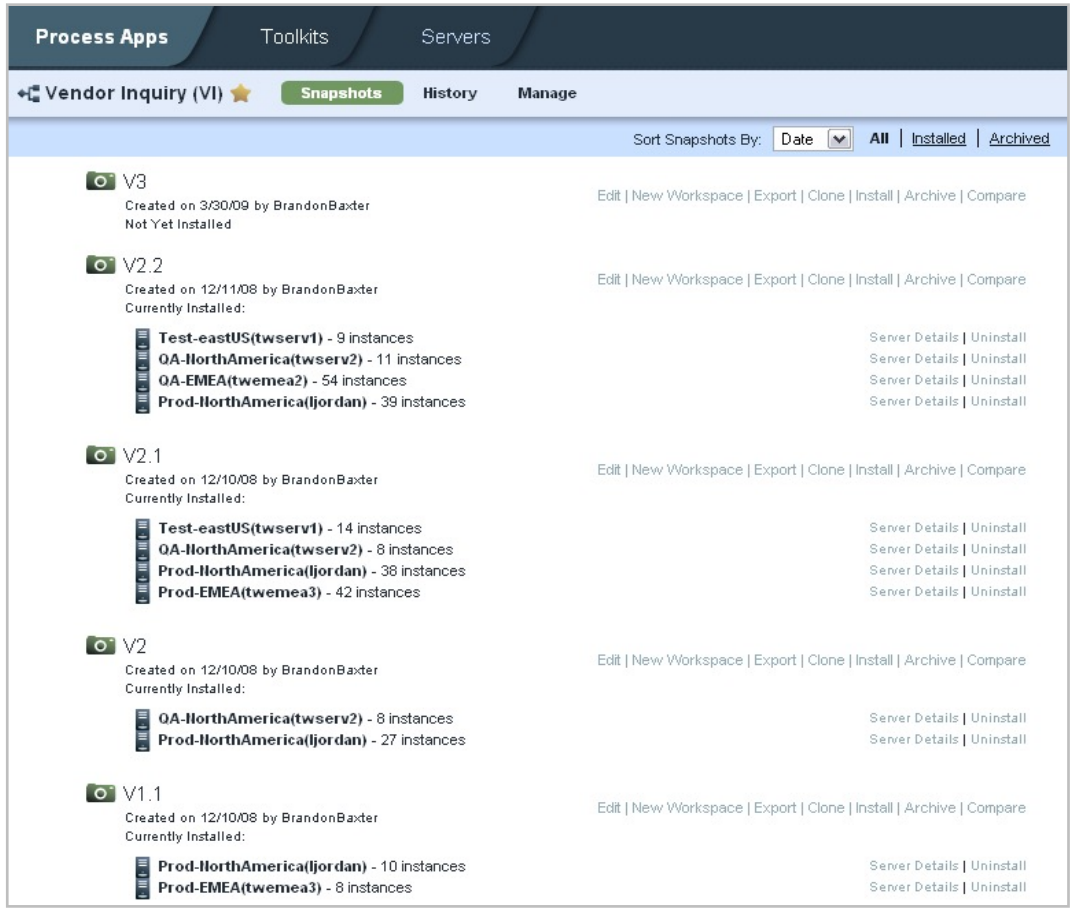
Drag-and-drop user interface builder

- Over 70 out-of-box user interface components
- Ability to create additional reusable components

Workflow

Scale from initial projects to an enterprise-wide program

- Toolkits provide reusable functionality across workflows
- Graphical interface provides visibility into workflow deployment
- Enterprise versioning capabilities manage updates while process instances are in-flight



One-click deployment across dev, test and production environments

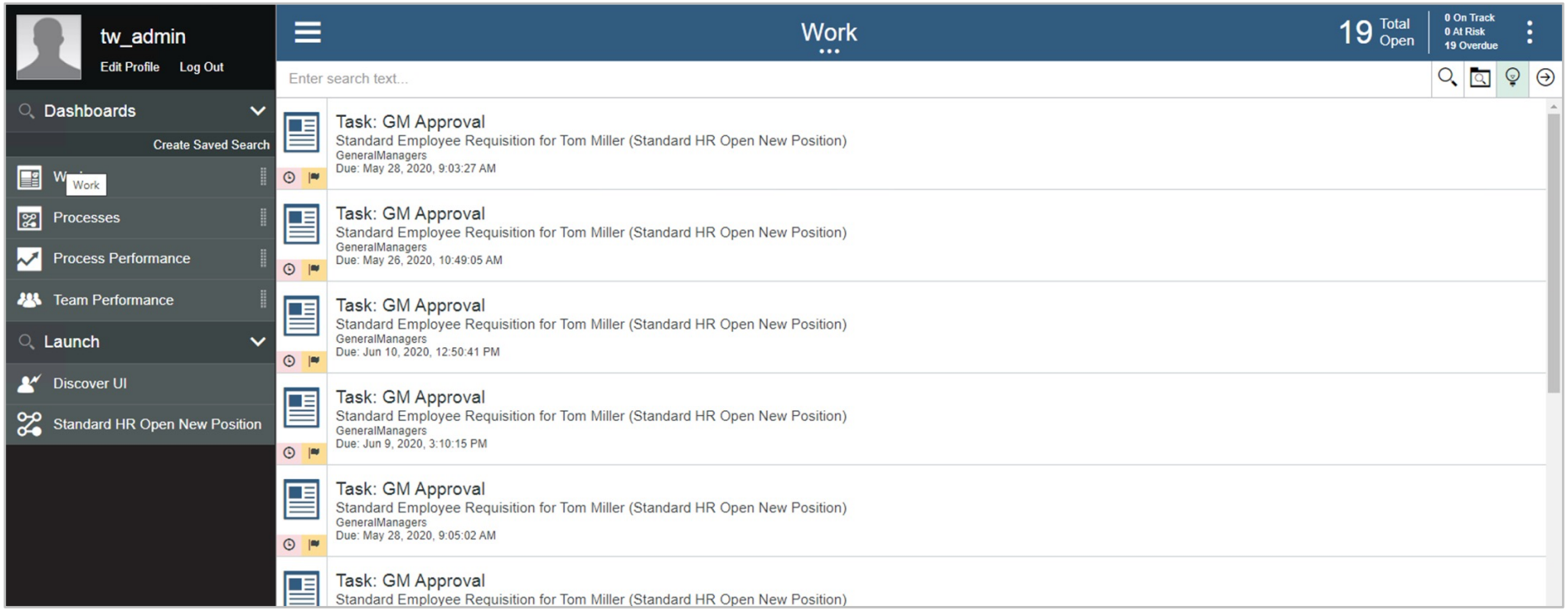
Enterprise capabilities to execute **millions of real-time process instances**

Workflow

Apply AI to improve workflow productivity

Intelligent task prioritization

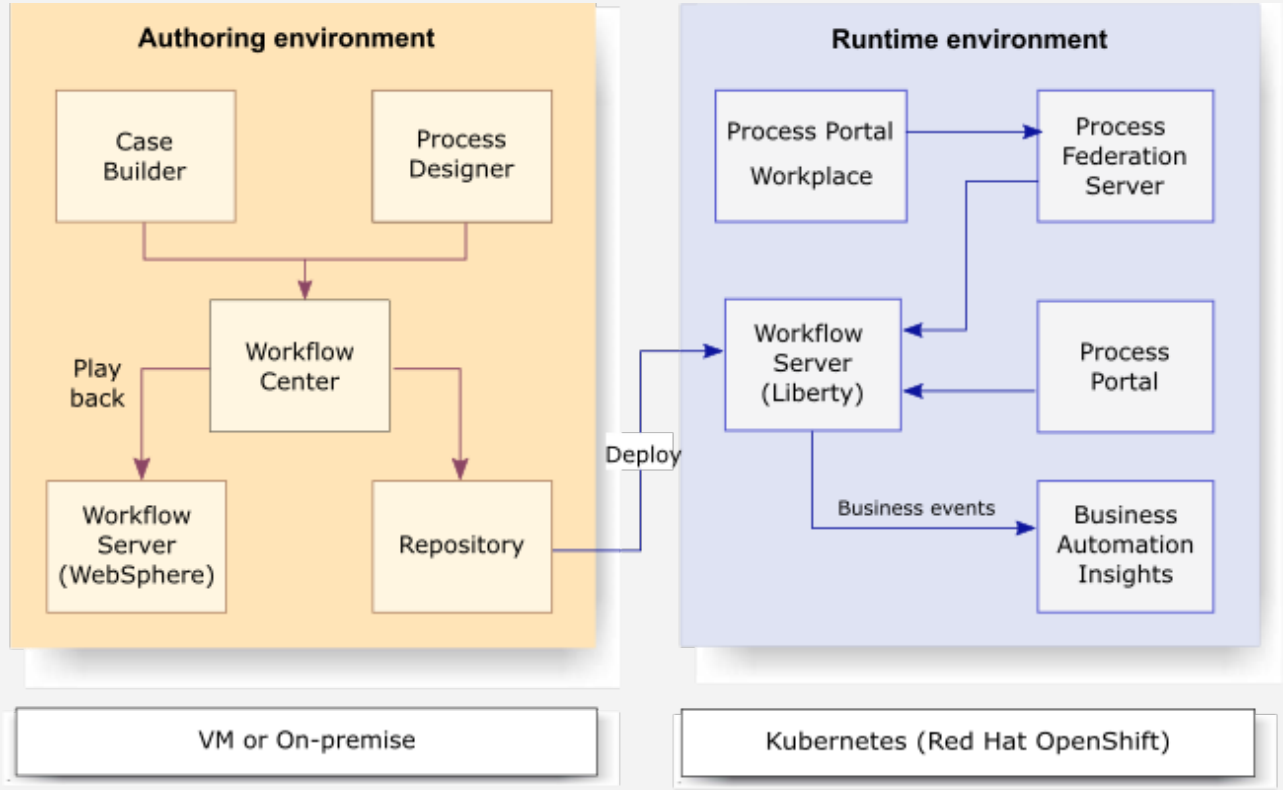
- Every task in a worker's task list is scored using predictive analysis:
  - Skill score
  - Performance score
- Each worker's task list is sorted with the high-valued, high-skill, and high-performance tasks at the top of the list
- Workers are enabled to prioritize their time on the highest value tasks



Prioritized task list uses predictive analysis to score each worker's tasks by expected skill and performance

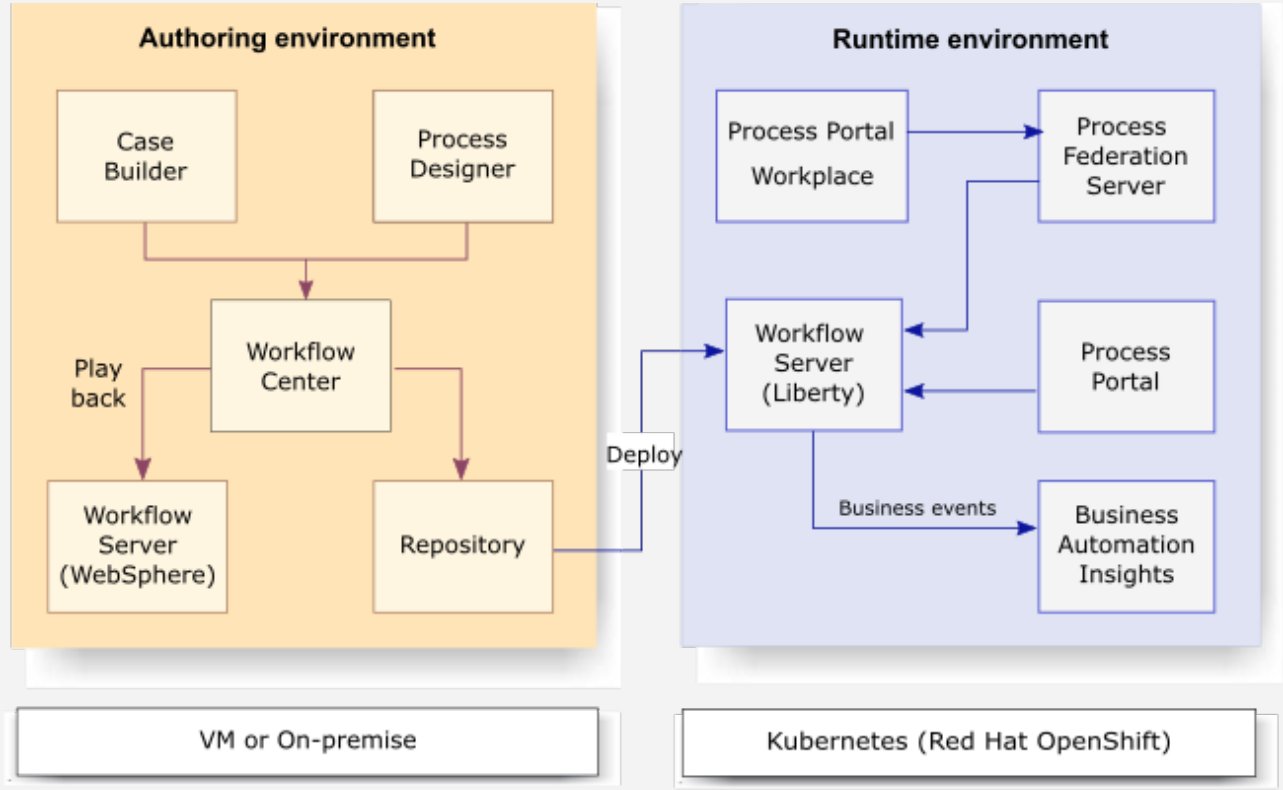
IBM Business Automation Workflow

- Optimize core business processes, orchestrate multiple business processes
- Workflow applications have four main components
  - Authoring environment to create and configure the application
  - Frameworks or models for sequencing and delegating work
  - A user experience for interacting with the application.
  - Administrative tools
- Authoring environment on-prem or VM
- Business Automation Workflow Runtime is containerized



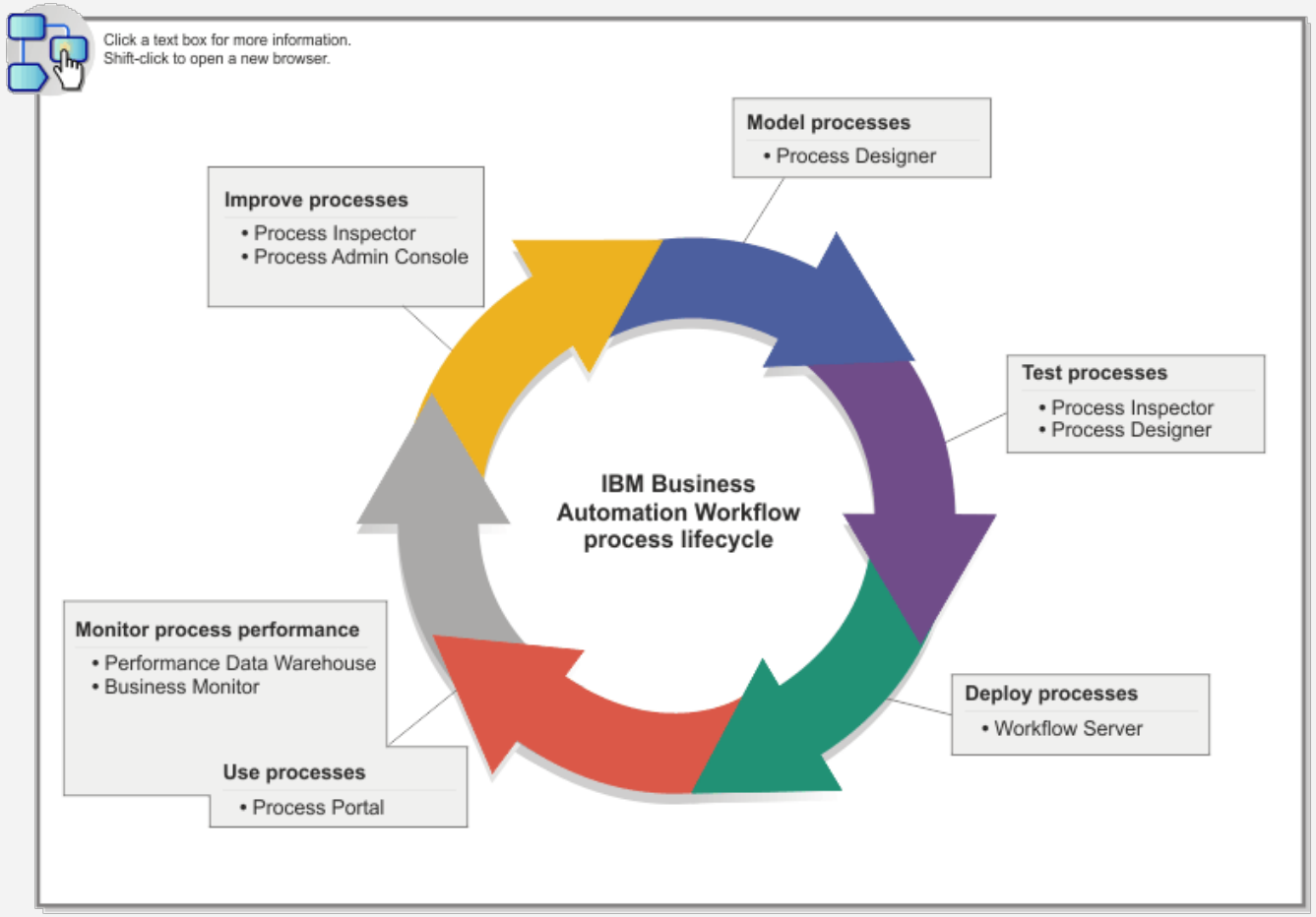
IBM Business Automation Workflow Components

- Workflow Center
- Workflow Server
- Process Federation Server
- Process Portal
- Workplace
- Business Automation Insights
- Content Platform Engine



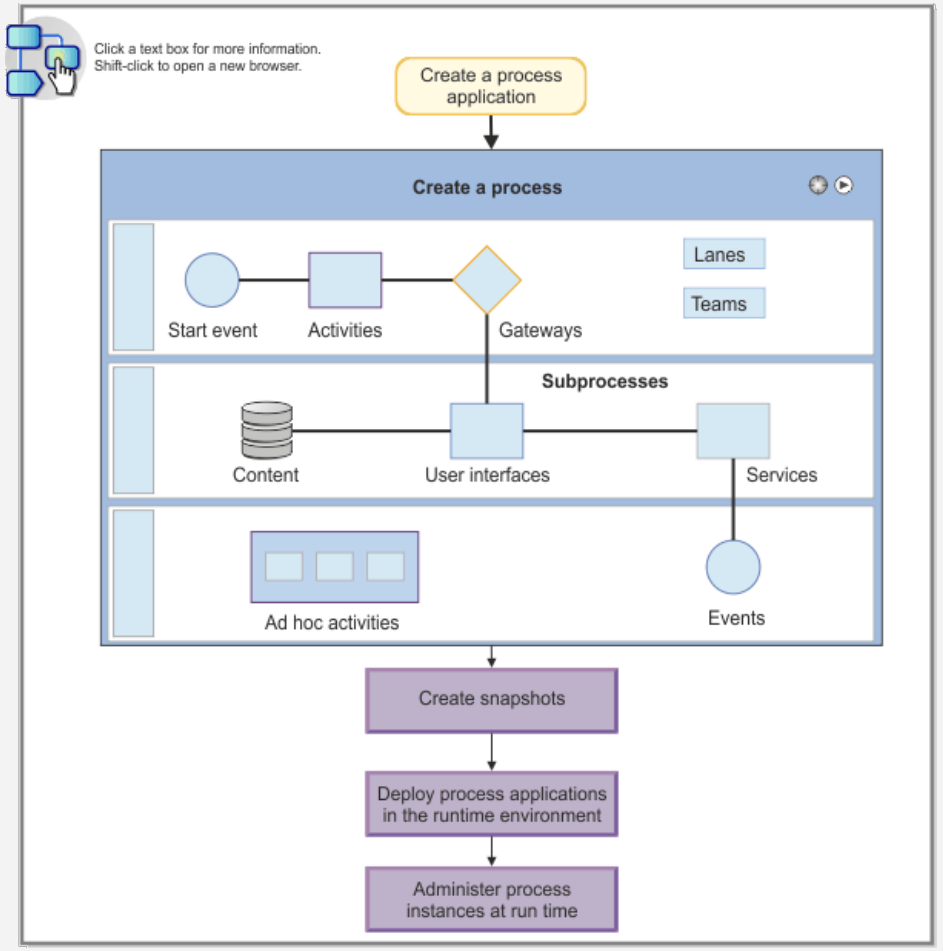
Business Automation Workflow

- Business process management approach is iterative
- A process application is the fundamental container for processes and their components
- Processes can be of structured or unstructured nature
- IBM Process Designer is the primary authoring tool for business processes



Creating a process

- Create a process application
- Create processes
  - Events
  - Activities
  - Gateways
  - Lanes
- Teams
- Create User Interfaces for business processes
- Managing snapshots
- Install / Deploy / Undeploy applications
- Administer process



Implementing Processes – Components & Concepts

- Activities Types:
  - User Task
  - Inline Task
  - Robot Task
  - System Task
  - Decision Task
  - Script
  - Subprocess
  - Linked Process
  - Event Subprocess

Working with Activities:
- Activity loops
- Conditional activities
- External implementations for activity
- “Unstructured” Ad-hoc activity
- Converging and diverging process flows with gateways

Events:
- Start
- Intermediate
- End
- Event

Management of Folders & Documents

Teams
Team Retrieval Services
Team Filter Services

Process instance relationships
- Independent
- Dependent

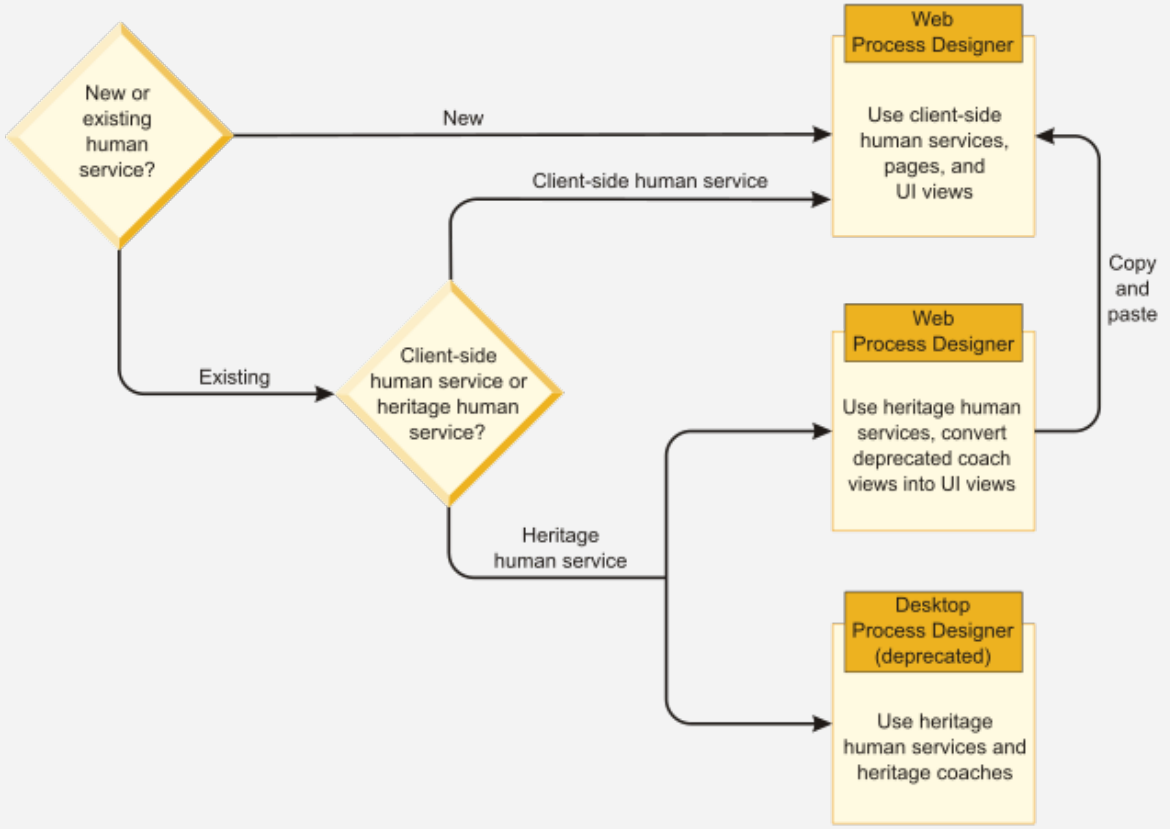
Add/Remove/Update/Query relationships using
- JavaScript
- REST API

Exposing Automation Services
- REST service
- Web Service

Consuming external services
- REST service (Swagger, JavaScript)
- Web Service
- ODM Business Rules (Decision Service – invoke as REST or Web Service)
- IBM Watson Services
- IBM Cloud Services

User Interfaces – Components & Concepts

- Heritage human services (deprecated)
- Client-side human services
- Coaches & UI Views
- Data Change Event Handlers



Choosing artifacts to create or modify a user interface

Enabling processes for tracking and reporting

- Enable your processes to make them trackable

- To track data in a process, use
  - Auto-tracking
  - Tracking groups
  - Or Both

- Create “Time intervals” to capture duration between start and end points between steps in a business process

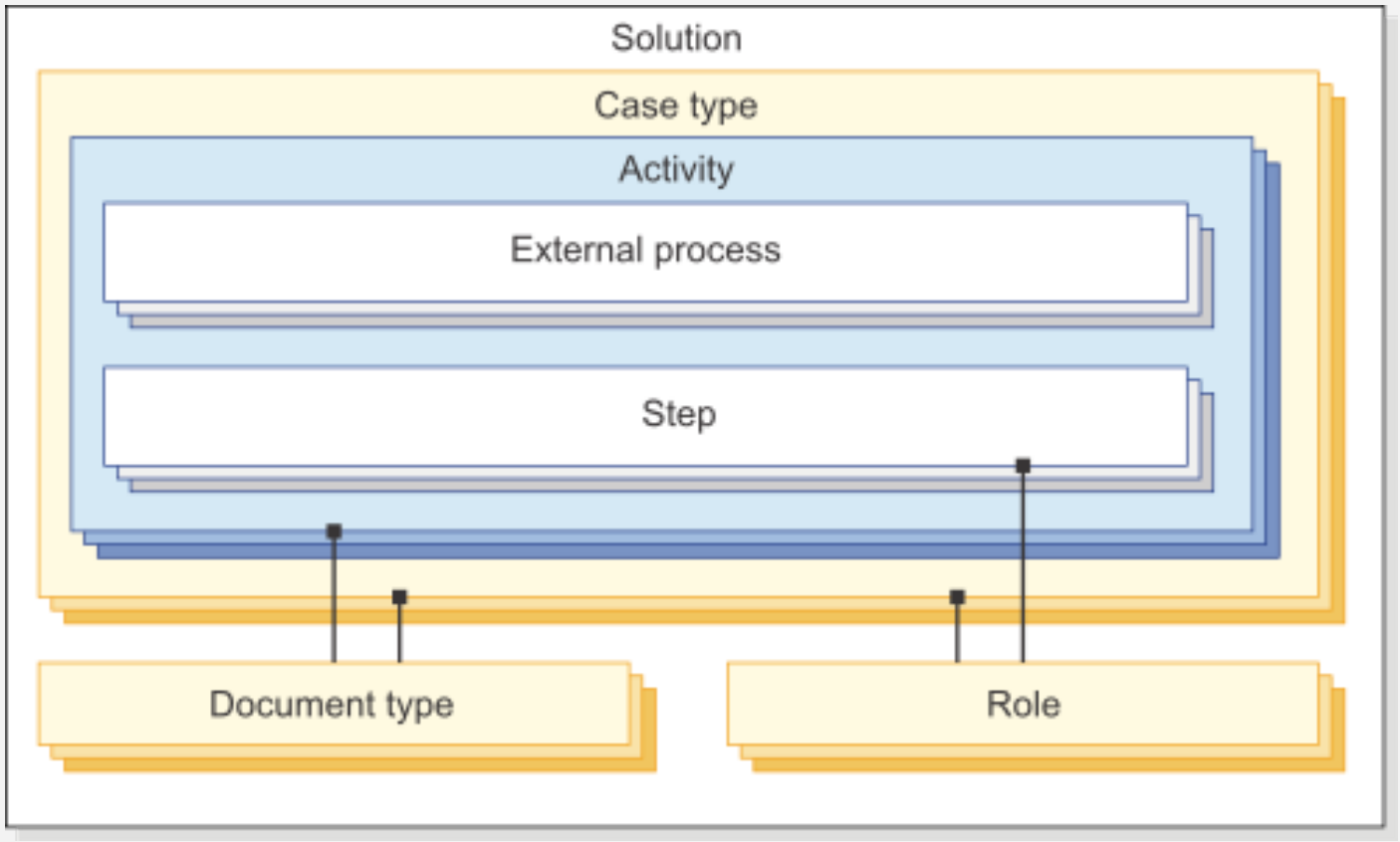
- Performance Scoreboards

Case Management

Case management solution concepts

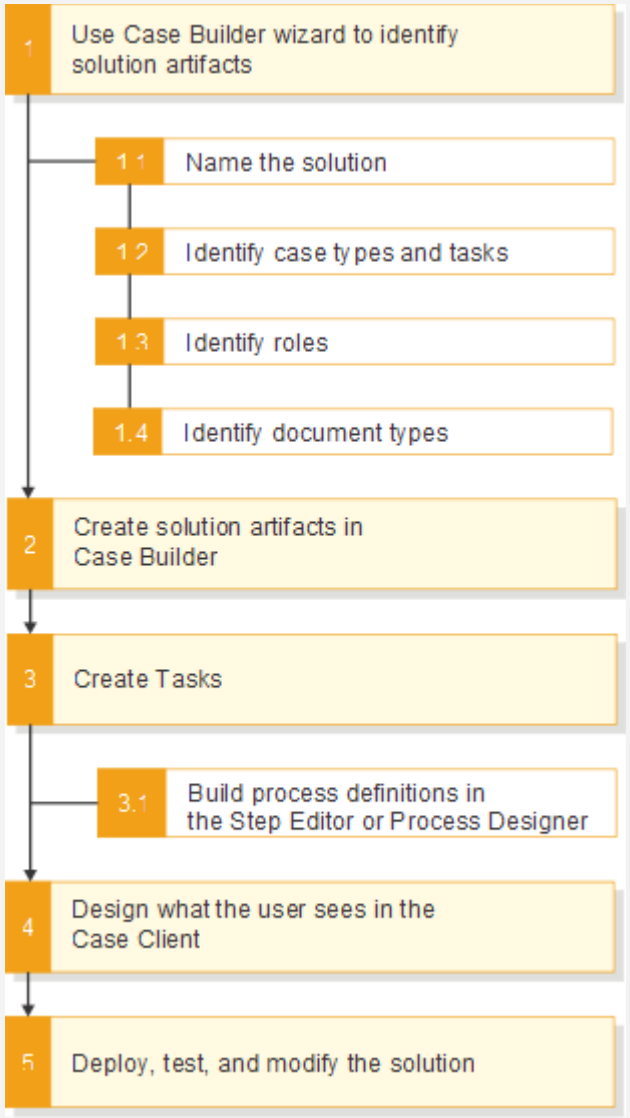
Concepts:
- Solution
- Case types
- Document classes
- Rules
- Views
- Activities
- Steps
- Roles
- Pages
- In-baskets

Tools:
- Case Builder
- Case Client
- Case Configuration
- Case Administration Client



Designing case management solution

- Identify document classes
- Case workers / participants
- Activities
- Who will work on which activities
- Create steps to map how the activity is implemented
- Preconditions for the activity if any
- Identify the properties of your solution
- Specify your decisions about document classes, case types, steps, preconditions etc.



Developing case management applications

- Create a solution by using one of the industry-solution templates provided by IBM or by using a blank template
- Work with Case Type, Activities, Properties, Roles, Document Classes, Business Object, Case Folders, Rules, Views
- You can develop custom Case Management applications using
  - Java API
  - JavaScript API
  - REST
- IBM CMIS for FileNet Content Manager to create, access the case content stored in object store.
- Create cases programmatically when document is added to an object store
- Access case data from external data source

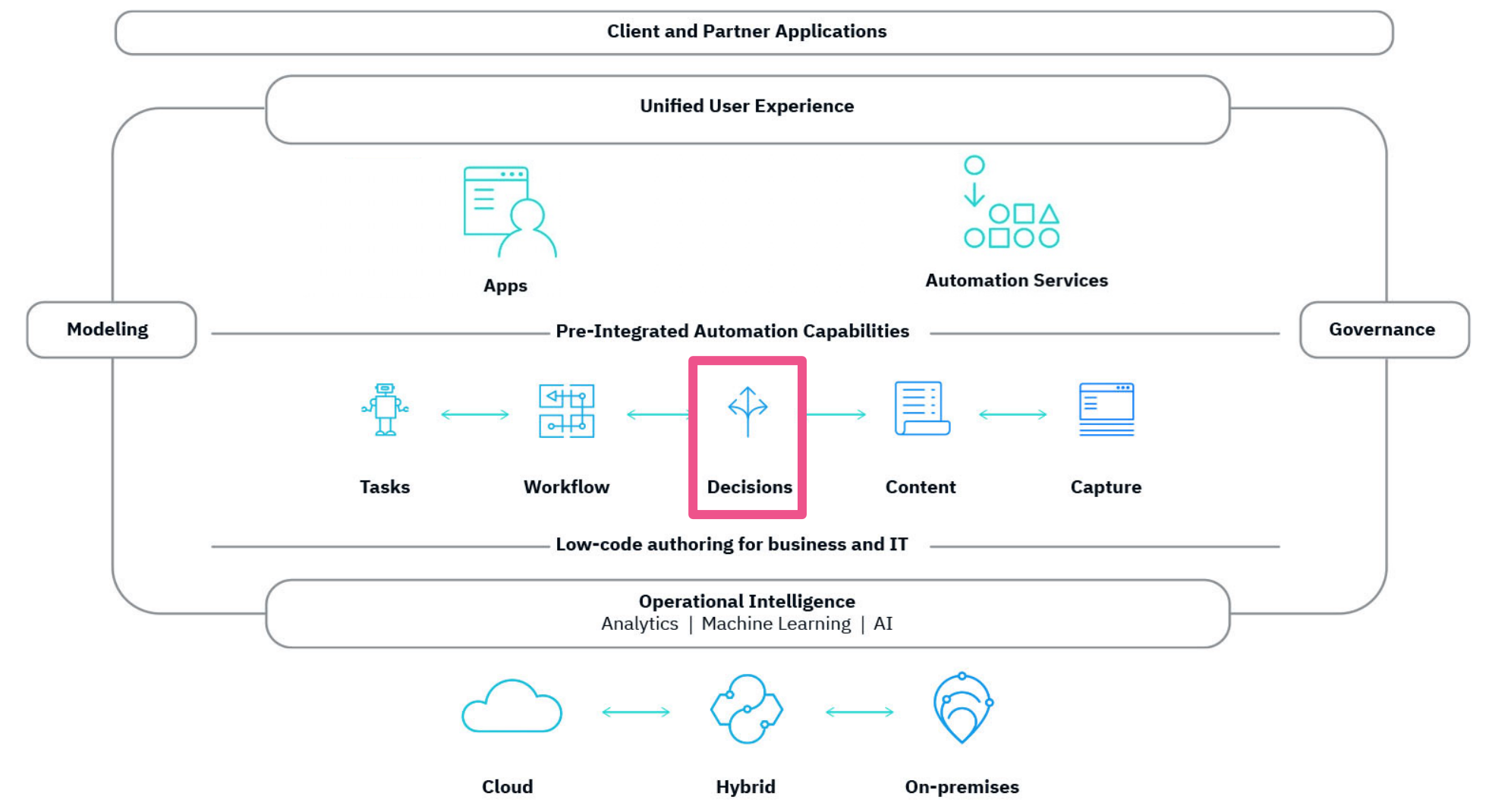
- Few of Java API features for developing **custom Case Management applications** :
  - The case types and document classes that are included in a deployed solution
  - Which page views are configured for a case type
  - Create cases
  - Retrieve history about cases
  - Retrieve a list of the activities of a case
  - Start manual activities
  - Stop and restart the workflow associated with an activity

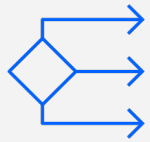
Managing cases

- Create new case, update or delete case (role / permission)
- Add users and groups to a role
- Add case members and managers to Teams (for Manager role)
- View, Open and Work on the assigned items in the In-basket (Personal or Role In-baskets)
- Move work item from Role In-basket to Personal In-basket
- Assign / Re-assign work items to users
- Use the Split Case action to create a case that reuses data from an existing case
- Add Activity (workflow / to-do / quick task) for a case

Operational Decision Manager

A Key Capability of the IBM Cloud Pak for Automation





Decision management

Decisions are the repeatable rules and policies made as part of day-to-day business operations.

Decision management is the software used to gather, manage, execute and monitor decisions.

Why IBM?

- Comprehensive business rules lifecycle management
- Business-friendly capabilities for development, testing and governance

Define

- No-code decision modeling
- Graphical guided tools to model and validate decisions
- Integrates business rules with machine learning

Execution and testing

- Test and simulate decisions
- Execute decisions with speed and consistency
- Highly scalable micro services architecture
- Execution tracing for auditability

Governance and lifecycle management

- Release management and versioning
- Role-based permission management

Why should you abstract and manage business decisions?

Programming based traditional approach

- Business logic is owned by IT
- Rules are locked in processes and applications
- Complex to handle
- Difficult to update rules and processes
- Higher risks of inconsistency and non-compliance

Decision management system externalize the decision logic from applications

- Business logic is owned by Line of Business
- Enables fast, safe changes to rules
- Business rules can be blended with ML-based predictions
- Ensures performance and scalability
- Ensures auditability and consistency

ODM Lead Qualification Questions

1. Is the decision a business policy managed by business users?
2. Does the business policy change regularly?
3. Does the decision take multiple factors into account?
4. Do you plan to include predictive analytics in your decisions?

With digital automation, a small number of business experts can create business rules that drive success across these business priorities...

Improve responsiveness

- Increase decision speed
- Detect business situations on time
- Adapt faster to changes

Reduce costs

- Increase loan origination automation
- Reduce non-compliance costs
- Prevent credit losses

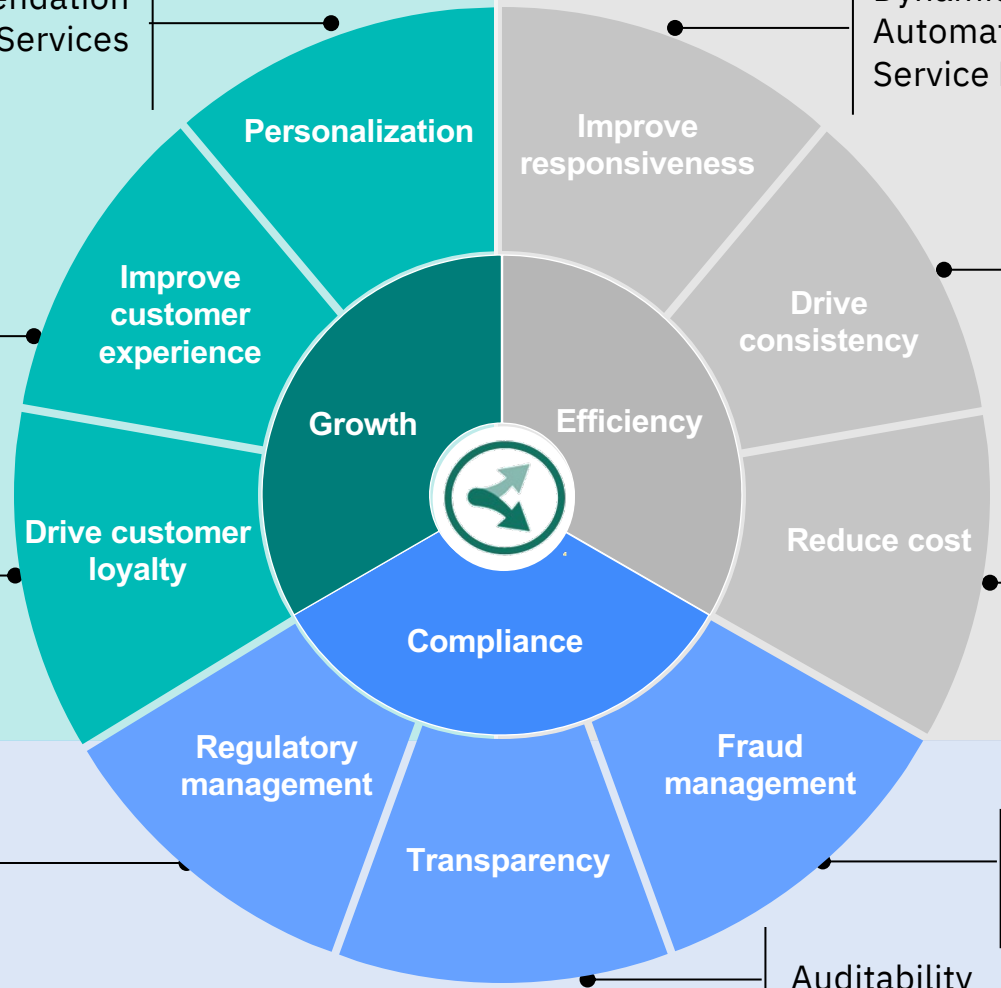
Ensure compliance

- Drive consistency between geos, channels and regulations
- Traceability for regulation compliance auditing
- Detect fraud systematically

Use Cases Across 3 Dimensions

Adapt to market changes quickly

Increase Operational efficiency



Product Recommendation
Personalized Offerings & Services

Onboarding Processing
Loan Origination
Claim Processing
Customer Self-service

Loyalty Programs
Dynamic Pricing & Bundling
Cross-sell & Upsell

Dynamic Pricing
Automated Loan / Claim / Service Processing

Regulatory Policies
Tax / Benefit Calculation
Pricing
Compensation Management

Onboarding Processing
Customer Support
Revenue Integrity

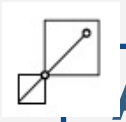
Compliance Screening
Regulatory policies
Underwriting

Auditability
Traceability

Fraud Detection
Risk Assessment

Comply with Regulations

Why should you use ODM to manage business decisions?



Adapt to market changes quickly

- Increase decision speed
- Detect business situations on time
- Consider multiple factors

40-times faster processing in loan origination.

At First National Bank

Comply with regulations

- Drive greater consistency between enterprise and regulations
- Reduce non-compliance costs

Renders comprehensive audit trails of decisions.

A major US Personal Lines carrier

Increase operational efficiency

- Increase transaction automation
- Improve productivity with intelligent automation

80% reduction in manual processing.

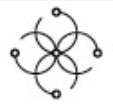
A European General Insurer

Enterprise Proven Technology

Multiple global enterprises rely on ODM for mission-critical workloads

Comprehensive and Ease of use

Complete set of integrated decision management and governance capabilities



Rich Ecosystem

Strong business partner ecosystem to ensure your success in your implementation

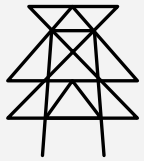
Example of Decision Automation Use Cases by Industry

Banking & Financial Services

- Reduced loan processing times
- Customer onboarding
- Financial risk and regulatory investigations
- Cross-sell /Up-sell
- Loyalty campaign management

Government and education

- Customs and border control
- Benefits and services eligibility
- Tax payments



Energy and utilities

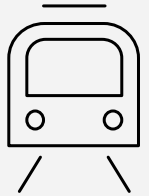
- Power grid management
- Bill processing
- Energy consumption management

Retail and consumer products

- Retail orders
- Customer service
- Customer loyalty programs

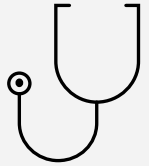
Insurance

- Automated claims processing
- Underwriting
- Fraud investigations
- Cross-sell /Up-sell
- Loyalty campaign management



Travel and Transportation

- Online ticketing and reservations
- Invoicing
- Customer Loyalty programs



Healthcare and life sciences

- Improved patient care processes
- Donor matching processes
- Medical fraud investigations

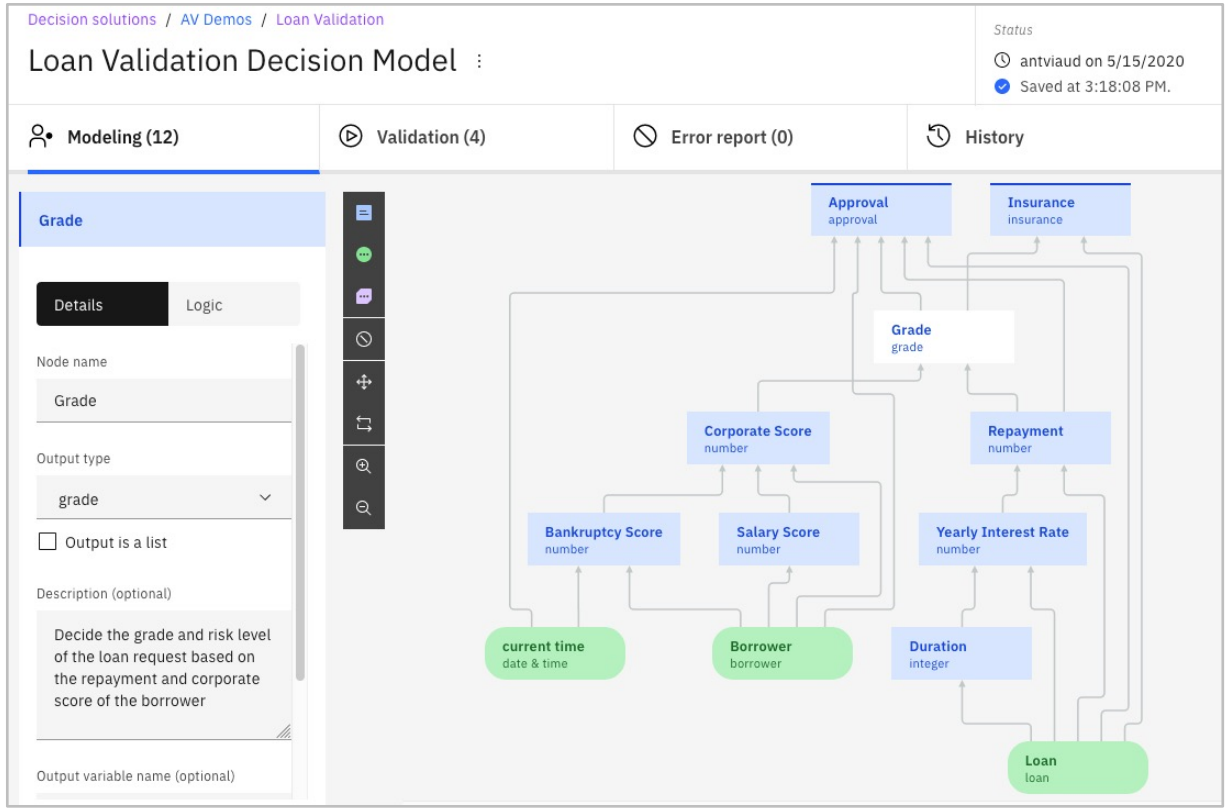
Manufacturing

- Manufacturing production quality and control
- Defect Investigations
- Conditioned-based maintenance

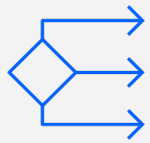
Decision management

Business-friendly tooling for decision management

- Intuitive business-friendly tooling to model repeatable decisions
- Business experts create and edit rules using natural language
- Test and govern decisions within a business environment
- Integrated capability for decision automation



Low-code editors provide easy-to-use tools to graphically model business decisions



Decision management

Scalable and secure decision automation

Testing and simulation

- Step-by-step debugging with value inspectors
- Test suite definition, simulation and rule analysis

Centralize decisions

- Centralize and externalize business knowledge
- Simple effective governance and security

Execution at scale

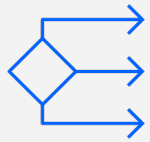
- High performance and scalability for the most demanding enterprise deployments
- Supports transactional and batch rule execution

	Repayment		Corporate Score		Grade	
	min	max	min	max	grade	message
1	0	10,000	≥ 900		A	Very low risk loan
2	0	10,000	600	900	A	Very low risk loan
3	0	10,000	300	600	B	Low risk loan
4	10,000	30,000	≥ 900		A	Very low risk loan
5	10,000	30,000	600	900	B	Low risk loan
6	10,000	30,000	300	600	C	Average risk loan
7	30,000	60,000	≥ 900		B	Low risk loan
				900	C	Average risk loan
				600	D	Risky loan
					C	Average risk loan
				900	D	Risky loan
				600	E	Very risky loan

```
if
   all of the following conditions are true :
      - ( 'Repayment' * 12 is at least 30000 and less than 60000 )
      - ( 'Corporate Score' is at least 900 ) ,
then
   set 'decision' to a new grade where
      the grade is "B" ,
      the message is "Low risk loan" ;
```

Highly scalable environment to manage millions of business rules

Enterprise decision capabilities with scalability to **execute over 1 billion decisions per day**



Decision management

Integrated machine learning for better decisions

Built-in integration of business rules and machine learning

- Machine learning models accessible to business analysts in a low-code environment
- Extend rules-based decisions by incorporating machine learning models
- Native integration with Watson Machine Learning predictive analytics
- Extensive framework for third-party machine learning providers

Prescriptive rules

Business rules
Business strategy and regulatory constraints

If the applicant credit score is low

And the applicant is a platinum customer

+

Predictive models*

Insights
Machine Learning model trained on historical data

And the applicant propensity to churn is high

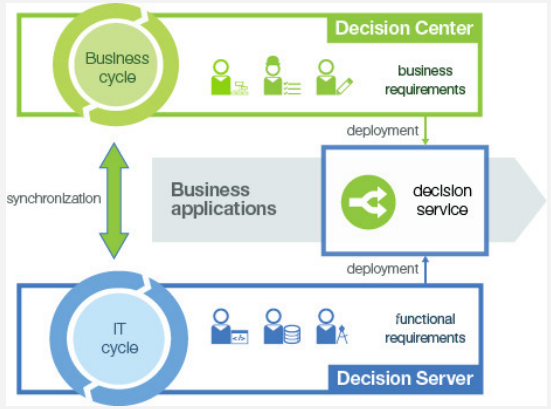
=

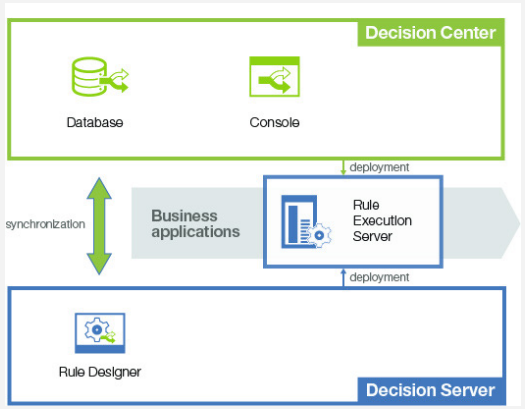
Customer response

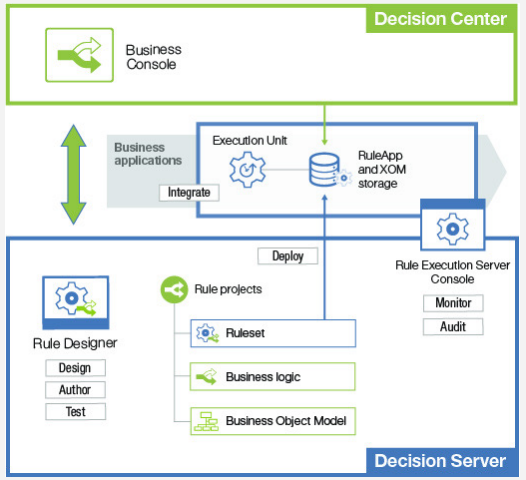
Then accept the application

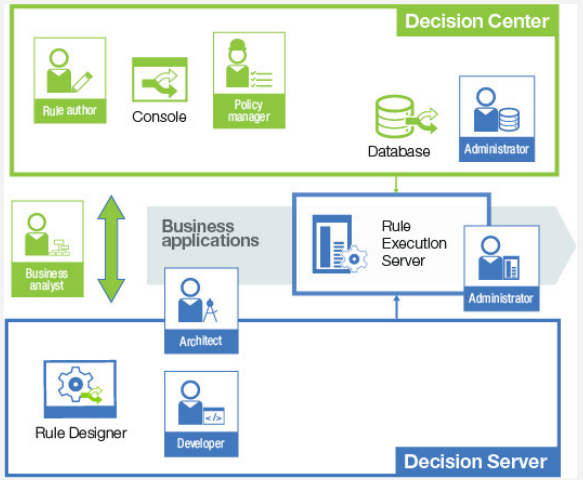
*Native integration with Watson Machine Learning

Business & IT Collaboration, Tools & Roles





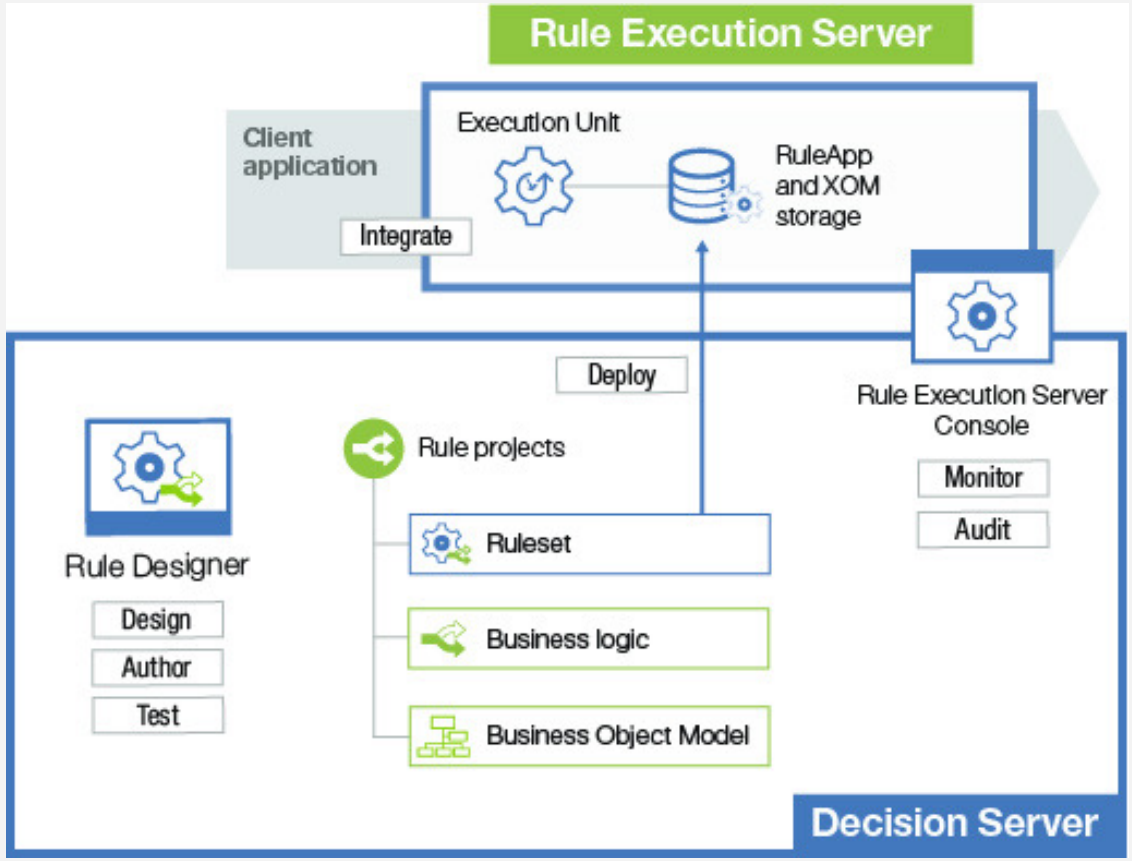




- Business users manage decisions
- Distributed business teams can collaborate through Decision Center
- More responsive to market changes, quicker releases
- Business and IT cycles run independently and in parallel

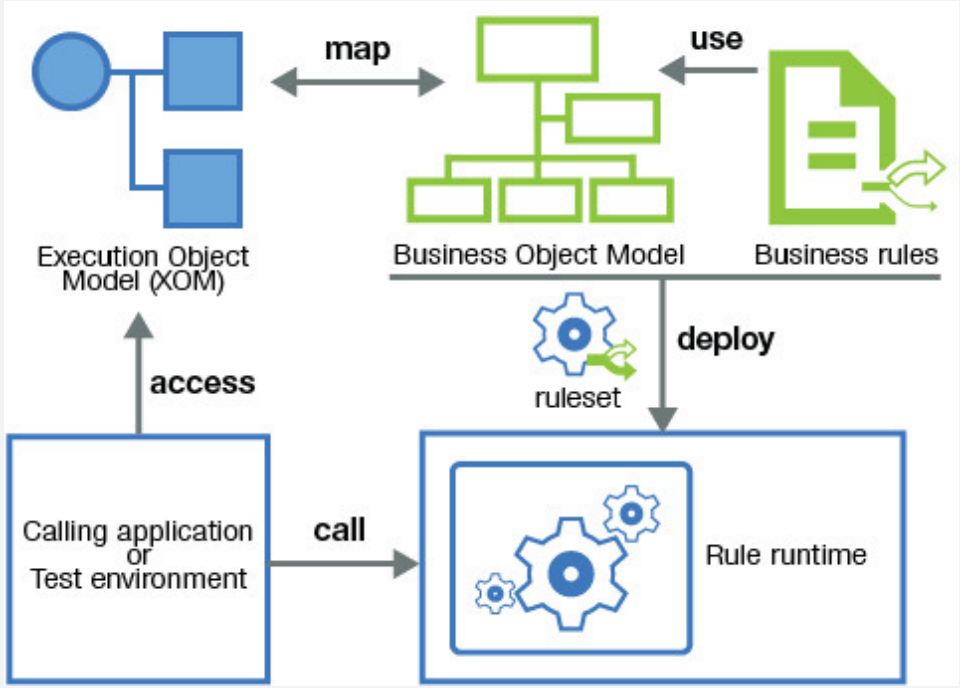
Decision Server Rules

- Set of business rules put together as one executable decision unit – the “ruleset”
- Define business object model (BOM) - the elements and relationships in the vocabulary
- Define the vocabulary by mapping the BOM to the Execution Object Model (XOM)
- Alternatively create the vocabulary by generating the BOM from the XOM, and then configuring the business vocabulary from the BOM
- Set up a rule project hierarchy
  - In case of decision services, a main rule project is designed to be the top-level project
- Organized rules under packages, define rule-flow, model extension (custom rule properties),
- Configure and customize test and simulations for validation by business users

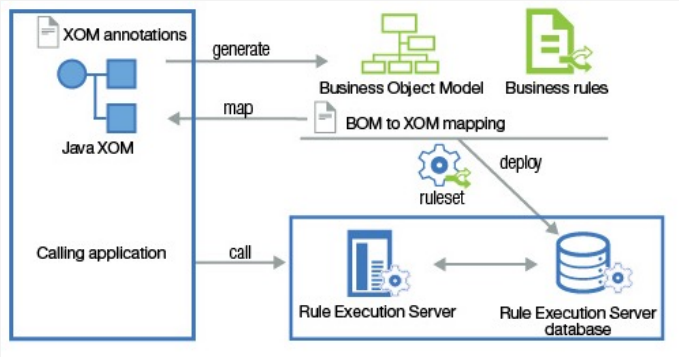


BOM and XOM

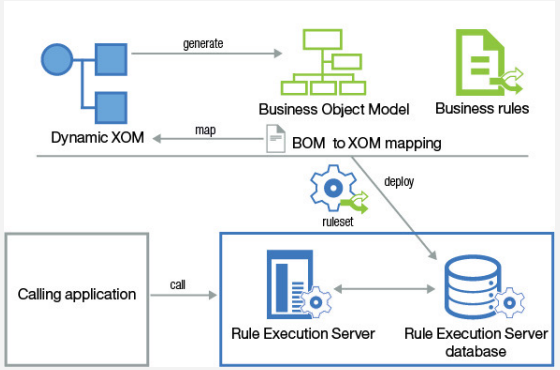
- XOM is the execution object model against which you run rules
- XOM maps to BOM, element mapping need not be one-to-one
- At run time, rules that were written against the BOM are run against the XOM
- Create BOM from Java or XML (“Dynamic XOM”)
- XOM Annotations to influence BOM generation
- Extend the BOM with business classes and methods using BOM-to-XOM mapping in the BOM Editor



Java XOM



XML XOM



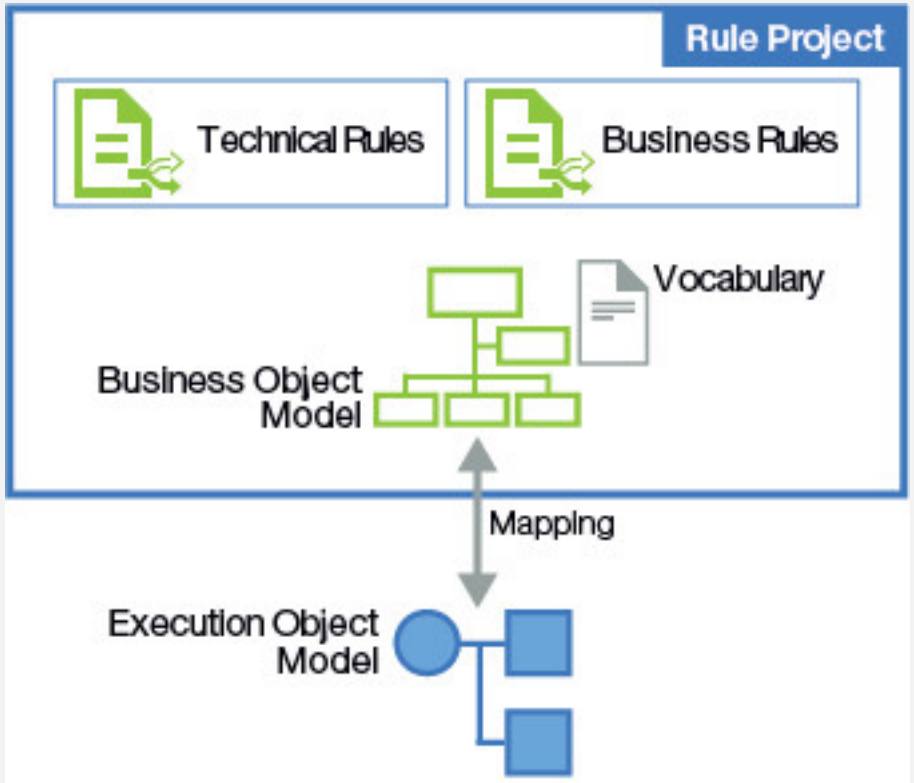
Client App → Java XOM → Transform using BOM-XOM mapping → Invoke Rules

Configuring the BOM for rule authoring

- Use a vocabulary to write rules,
- Define the vocabulary in the business object model (BOM)
- Bottom-up and Top-down approaches for defining BOM

- Rule Projects contain
  - Business rules, which express a business policy.
  - Technical rules, which comprise a *condition* part and an *action* part.

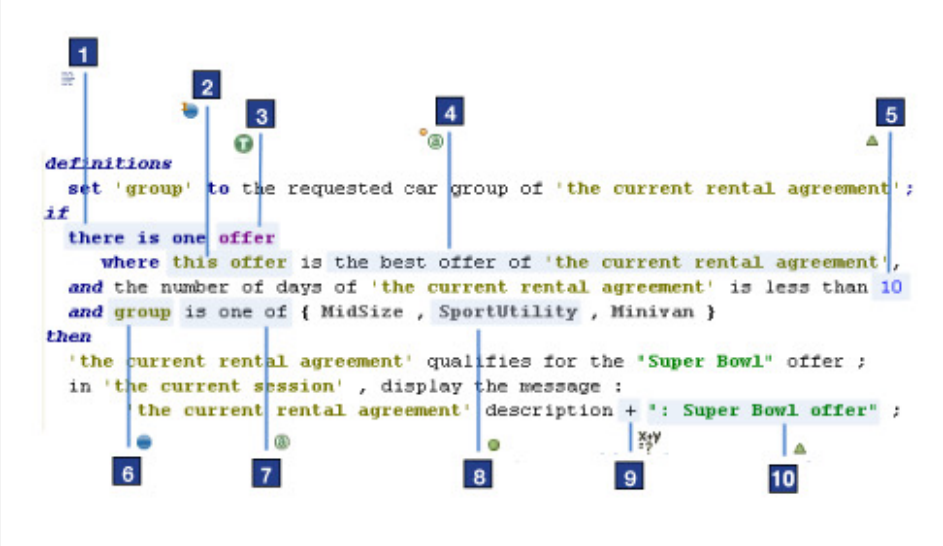
- Categorize business rules and business elements
- Use domains to make BOM more specific



Authoring business rules

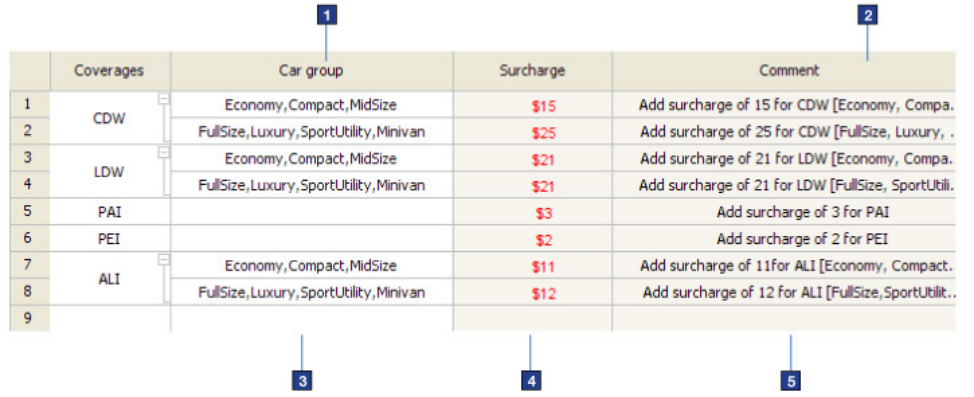
- Use Rule Designer or Decision Center to author rules
- Use Business Action Language (BAL) to express business rules (action rules, decision tables)
- Action Rules, Decision Tables == “Decision Logic”
- Decision trees and Rule Templates are deprecated in V8.8.1 – do not use them, slated to be removed
- Use categories to filter the terms and phrases available to you when you edit rules in Rule Designer or Decision Center.
- Use Custom Properties (rule model extension) to manage business rules
  - Example: Custom property “geography” to identify the rules that apply to that region.

Sample Action Rule



1) BAL construct
2) Implicit variable
3) Term
4) Phrase
5) Number value
6) Rule variable
7) BAL operator
8) Constant
9) Arithmetic operator
10) Text value

Sample Decision Table



	Coverages	Car group	Surcharge	Comment
1	CDW	Economy,Compact,MidSize	$15	Add surcharge of 15 for CDW [Economy, Compa.
2		FullSize,Luxury,SportUtility,Minivan	$25	Add surcharge of 25 for CDW [FullSize, Luxury, .
3	LDW	Economy,Compact,MidSize	$21	Add surcharge of 21 for LDW [Economy, Compa.
4		FullSize,Luxury,SportUtility,Minivan	$21	Add surcharge of 21 for LDW [FullSize, SportUtili.
5	PAI		$3	Add surcharge of 3 for PAI
6	PEI		$2	Add surcharge of 2 for PEI
7	ALI	Economy,Compact,MidSize	$11	Add surcharge of 11for ALI [Economy, Compact.
8		FullSize,Luxury,SportUtility,Minivan	$12	Add surcharge of 12 for ALI [FullSize,SportUtilit..
9				

1) BAL operator, Terms, Phrases
2) Action Phrase
3) Constant
4) Number value
5) Text value

Technical rules

- Support constructs unavailable in BAL such as loops, and explicit IRL mapping
- Technical rules are written using the ILOG Rule Language (IRL).
- IRL is a Java-like rule language that can be executed directly by the rule engine.
- A technical rule is made of a **condition** part and an **action** part.

Examples of IRL **condition** keywords:

- collect
- evaluate
- exists
- from
- in
- instanceof
- not
- where

Examples of IRL **action** keywords:

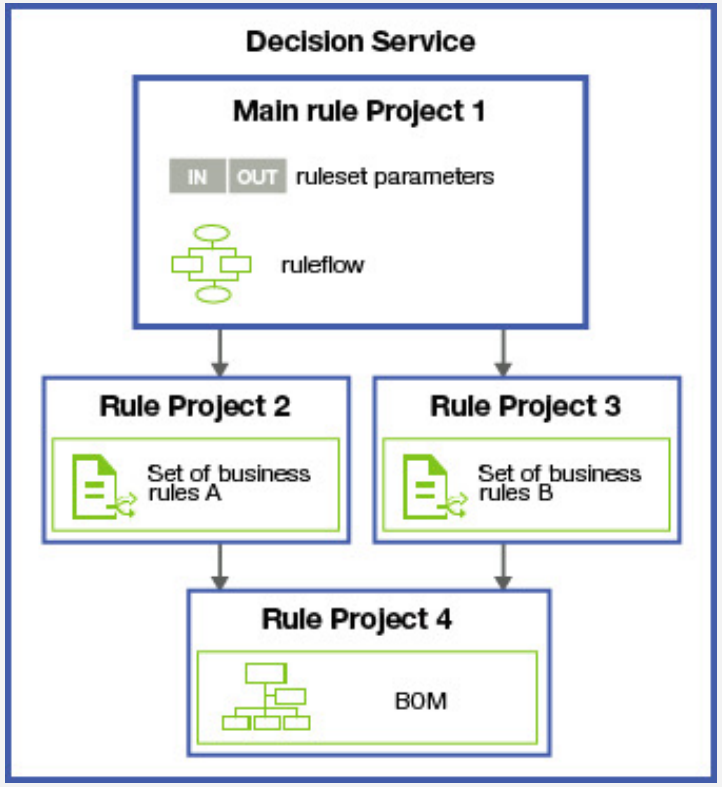
- break
- catch
- continue
- foreach
- modify
- retract
- try
- update
- throw
- while

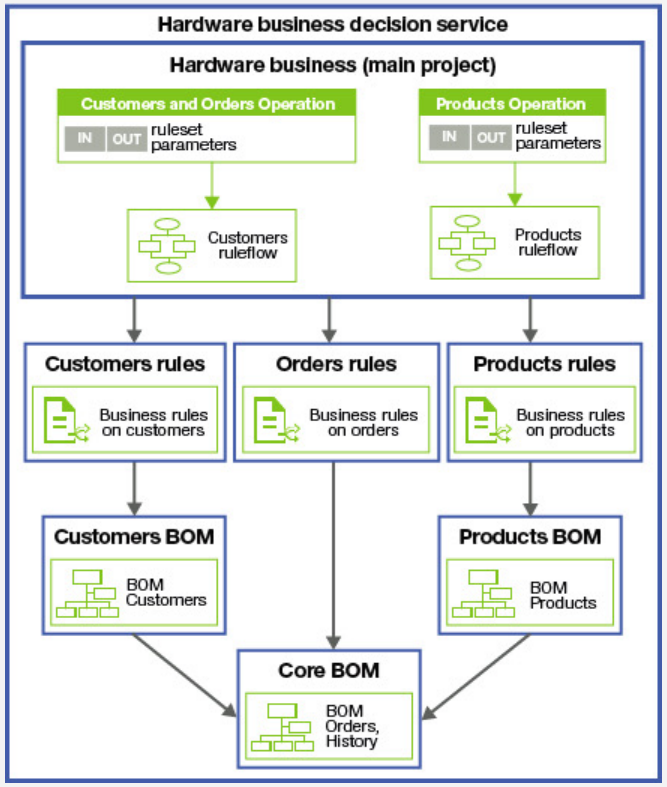
Sample Technical Rule in IRL

```
then {
    System.out.println("The account " + account + " has no
                money in it");
    Report report = new Report(account);
    dispatcher.send(report); // dispatcher is a ruleset parameter
}
```

Where do these artefacts go ? – Decision Services & Rule Projects

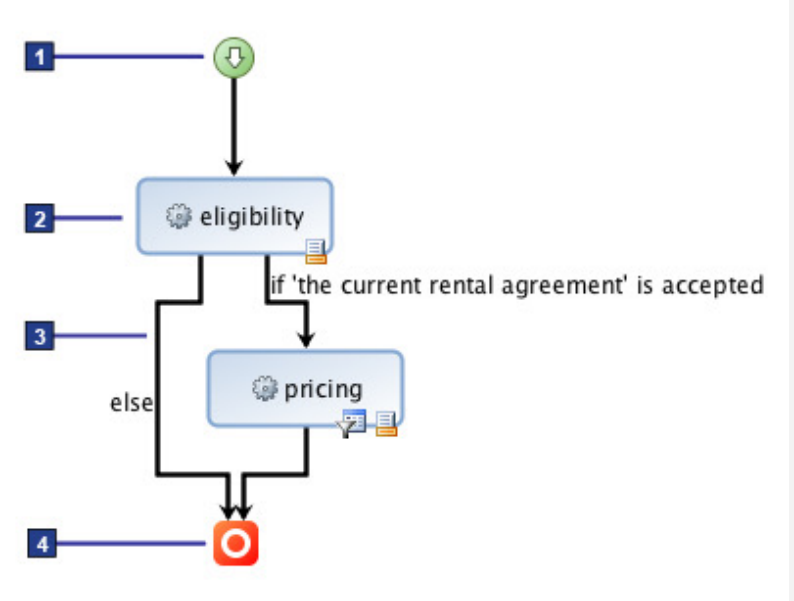
- Create a decision service with its rule projects, either from scratch or by using a template
- Set up the rule project structure and add rule packages, to make your application more modular
- Add rules and rule artifacts into a ruleset
- Define the content of a ruleset, as well as the input and output parameters
- Classic Rule Projects are deprecated
- Rule project automatically creates folders for rule project items





Orchestrating ruleset execution – “Rule Flows”

- Rule-flows organize rules, assemble rules into “rule task” groups
- Each rule task is evaluated to produce a result, or decision.
- All these results and decisions are combined to produce a single business decision, represented by a rule-flow.
- “Rule transitions” determine how, when and under which conditions to use rule task.
- Each rule task in a ruleflow has a scope
- “Rule filtering” on the value of rule properties and execution parameters
- Rules can be overridden by other rules
- Create a ruleflow in Rule Designer



1) Start node
2) Task (“assembly of rules”)
   - Rule Task
   - Action Task
   - Subflow Task
3) Transition
4) End node

Branches
Forks and joins
Initial & Final actions

Testing and simulation

- Run tests and simulations in Rule Designer or Decision Center
- Examine reports generated in the Decision Center Business console for Success, Failure, Error outcomes

Sample **Simulation** setup

		the borrower				the loan		
6	Scenario ID	first name	last name	credit score	yearly income	duration	amount	rate
9	Big Loan	John	Smith	600	80000	24	500000	5
10	Small Loan	John	Smith	600	80000	24	25000	5

Scenarios | HELP

Sample **Testing** Rule

	Scenario ID	the yearly repayment equals	the loan report is approved equals	the message equals
9	Big Loan	39597	FALSE	Too big Debt-To-Income ratio
10	Small Loan	1979	TRUE	Loan approved

Scenarios | Expected Results | HELP

Operational Decision Manager event processing

- Raw events are processed to time series, which are indexed in Elasticsearch
- Customize how events are transformed and where to route events depending on their content
- IBM Business Automation Insights processes raw events that are emitted by Operational Decision Manager.
- You can monitor data from Elasticsearch through Business Performance Center

Operational Decision Manager event processing - Raw events example (1/2)

3 Jackson JSON serialization of the input parameters according to the Java **Execution Object Model (XOM)**.

4


```
{
 "business-events-envelope-version":"1.0.1",
 "business-events-extension-version":"odm/1.0.0",
 "id":"D052B561-0000-C0F4-B5AE-26C293E11327",
 "timestamp":"2018-07-16T17:25:59.178Z",
 "type":"odm:Execution:EXECUTION_SUCCESS",
 "category":"odm:Execution",
 "source":{
  "id":"/loanvalidation/1.0/loanvalidationrules/1.0",
  "type":"ruleset"
 },
```

```
"data":{
 "odm":{
  "total-duration-ms":725,
  "input-parameters":{
   "borrower":{
    "firstName":"John",
    "lastName":"Doe",
    "yearlyIncome":100000,
    "zipCode":"91320",
    "creditScore":3,
    },
    "ssn":{
     "areaNumber":"123",
     "groupCode":"45",
     "serialNumber":"6789"
    }
   },
   "loan":{
    "numberOfMonthlyPayments":72,
    "startDate":1117576800000,
    "amount":100000,
    "loanToValue":0.7
   }
  },
```

```
"output-parameters":{
    "report":{
     "borrower":{
       ...
      },
       ...
     },
     "validData":true,
     "insuranceRequired":false,
     "insuranceRate":0.0,
     "approved":false,
     "messages":[
      " The loan amount is under the max authorized",
      "Credit score below 200",
      "We are sorry. Your loan has not been approved"
     ],
     "yearlyInterestRate":0.057,
     "monthlyRepayment":1643.16,
     "message": "The loan amount is under the max authorized ",
     "insurance":"none",
     "yearlyRepayment":19717.97
    },
    "score":"3",
    "grade":"null"
  },
```


1 odm:Execution:EXECUTION_SUCCESS
odm:Execution:EXECUTION_FAILURE
odm:Execution:TRACE_GENERATION_ERROR

2 <ruleAppName>/<ruleAppVersion>/<rulesetName>/<rulesetVersion>

Operational Decision Manager event processing – Raw events example (2/2)


```
"decision-events":[
    {
     "type":"task",
     "decision-events":[
      {
       "type":"task",
       "end-date":1544747956523,
       "start-date":1544747956523,
       "name":"loanvalidation#initResult"
      },
      {
       "type":"task",
       "decision-events":[
        {
         "type":"rule",
         "name":"validation.borrower.checkSSNdigits"
        },
        {
         "type":"rule",
         "name":"validation.borrower.checkZipcode"
        },
        {
         "type":"rule",
         "name":"validation.borrower.checkName"
        },
        {
         "type":"rule",
         "name":"validation.borrower.checkAge"
        },
       ],
       "end-date":1544747956561,
       "start-date":1544747956529,
       "name":"loanvalidation#validation"
      },
      {
       "type":"task",
       "decision-events":[
        {
         "type":"rule",
         "name":"computation.initialCorporateScore"
        },
        {
         "type":"rule",
         "name":"computation.bankruptcyScore_0"
        },
        {
         "type":"rule",
         "name":"computation.salary2score_5"
        },
        {
         "type":"rule",
         "name":"eligibility.checkCreditScore"
        },
        {
         "type":"rule",
         "name":"eligibility.approval"
        }
       ],
       "end-date":1544747956588,
       "start-date":1544747956583,
       "name":"loanvalidation#eligibility"
      }
     ],
     "end-date":1544747956591,
     "start-date":1544747956516,
     "name":"loanvalidation"
    }
   ]
  }
 }
}
```

Operational Decision Manager event processing – Time series events example (1/2)


```
{
  "version":"1.0.1",
  "id":"D052B561-0000-C0F4-B5AE-26C293E11327",
  "timestamp":"2018-07-16T17:25:59.178Z",
  "type":"EXECUTION_SUCCESS",
  "odmType":"ruleset",
  "rulesetPath":"/loanvalidation/1.0/loanvalidationrules/1.0",
  "duration":725,


 "data":{
   "loanvalidation.loanvalidationrules.in.borrower.firstName":[
    "John",
    "Emilien"
   ],
   "loanvalidation.loanvalidationrules.in.borrower.lastName":"Doe",
   "loanvalidation.loanvalidationrules.in.borrower.yearlyIncome":100000,
   "loanvalidation.loanvalidationrules.in.borrower.zipCode":"91320",
   "loanvalidation.loanvalidationrules.in.borrower.creditScore":3,
   "loanvalidation.loanvalidationrules.in.borrower.spouse.0.firstName":[
    "Maria",
    "Christina"
   ],

   "loanvalidation.loanvalidationrules.in.loan.numberOfMonthlyPayments":72,
   "loanvalidation.loanvalidationrules.in.loan.startDate":1117576800000,
   "loanvalidation.loanvalidationrules.in.loan.amount":100000,
   "loanvalidation.loanvalidationrules.in.loan.loanToValue":0.7,

   "loanvalidation.loanvalidationrules.out.report.borrower.firstName":"John",
   "loanvalidation.loanvalidationrules.out.report.borrower.lastName":"Doe",
   "loanvalidation.loanvalidationrules.out.report.borrower.yearlyIncome":100000,
   "loanvalidation.loanvalidationrules.out.report.borrower.zipCode":"91320",
   "loanvalidation.loanvalidationrules.out.report.borrower.creditScore":3,

   "loanvalidation.loanvalidationrules.out.report.validData":true,
   "loanvalidation.loanvalidationrules.out.report.insuranceRequired":false,
   "loanvalidation.loanvalidationrules.out.report.insuranceRate":0.0,
   "loanvalidation.loanvalidationrules.out.report.approved":false,
   "loanvalidation.loanvalidationrules.out.report.messages":[
    " The loan amount is under the maximum authorized",
    "Credit score below 200",
    "We are sorry. Your loan has not been approved"
   ],
   "loanvalidation.loanvalidationrules.out.report.yearlyInterestRate":0.057,
   "loanvalidation.loanvalidationrules.out.report.monthlyRepayment":1643.16,
   "loanvalidation.loanvalidationrules.out.report.message":" The loan amount is
under the maximum authorized\\nCredit score below 200\\nWe are sorry. Your loan
has not been approved",
   "loanvalidation.loanvalidationrules.out.report.insurance":"none",
   "loanvalidation.loanvalidationrules.out.report.yearlyRepayment":19717.97,
```

Operational Decision Manager event processing – Time series events example (2/2)


```
"trace.task.names":[
  "loanvalidation",
  "loanvalidation#initResult",
  "loanvalidation#validation",
  "loanvalidation#computation",
  "loanvalidation#eligibility"
 ],
 "trace.task.durations":[
  75,
  0,
  32,
  15,
  5
 ],
```

```
"trace.rule.names":[
   "validation.borrower.checkSSNareanumber",
   "validation.borrower.checkSSNdigits",
   "validation.borrower.checkZipcode",
   "validation.borrower.checkName",
   "validation.borrower.checkAge",
   "validation.loan.checkAmount",
   "validation.test.checkTest",
   "computation.initialCorporateScore",
   "computation.bankruptcyScore_0",
   "computation.salary2score_5",
   "computation.rate_5",
   "computation.repayment",
   "eligibility.checkCreditScore",
   "eligibility.approval"
  ]
}
```

Operational Decision Manager event processing - Updating the processing configuration

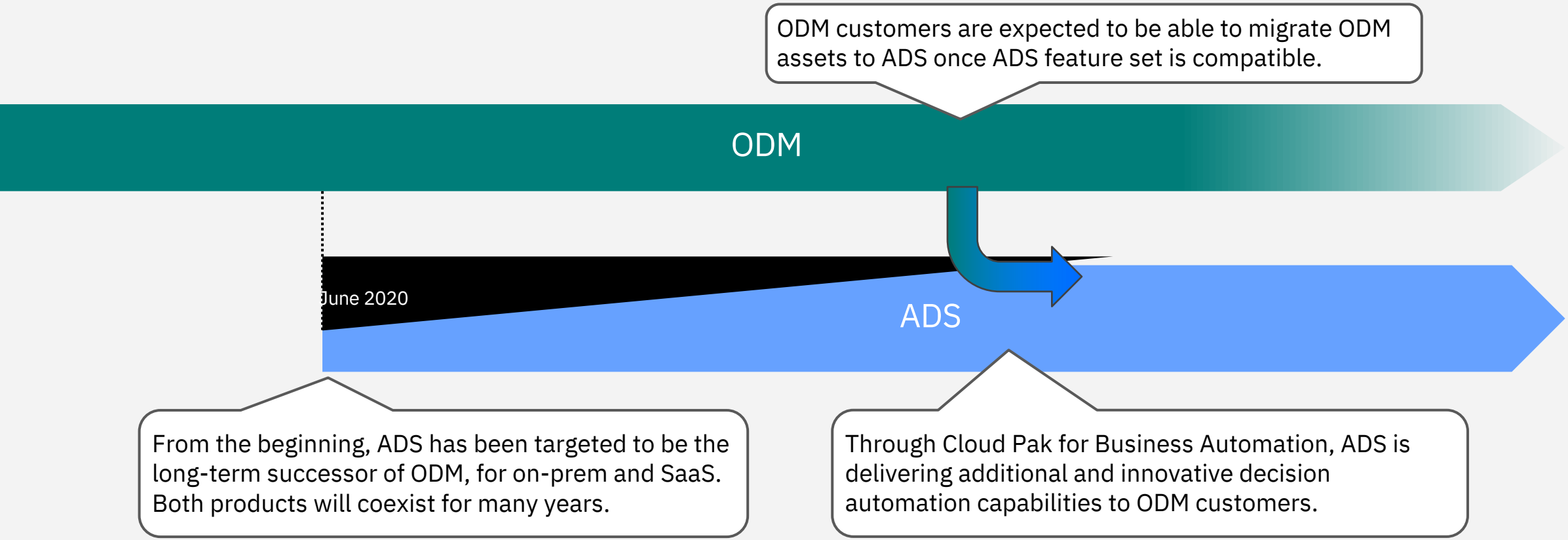
- Processing configuration defines how events are processed
- Set of files are defined in a Kubernetes ConfigMap that is named bai-odm
- processing-conf.json: The main configuration
- transformation.jslt: Defines the transformation of raw events into time series.
- elasticsearch-mapping.json: Defines the Elasticsearch mapping that is applied to the default index.
- ibm-bai-odm.jslt: Library of functions to transform ODM events.
- transformation-data.jslt: Example input and output business data only (after transformation).
- transformation-common.jslt: Example common data only (after transformation).

Operational Decision Manager event processing – Event Transformation Examples

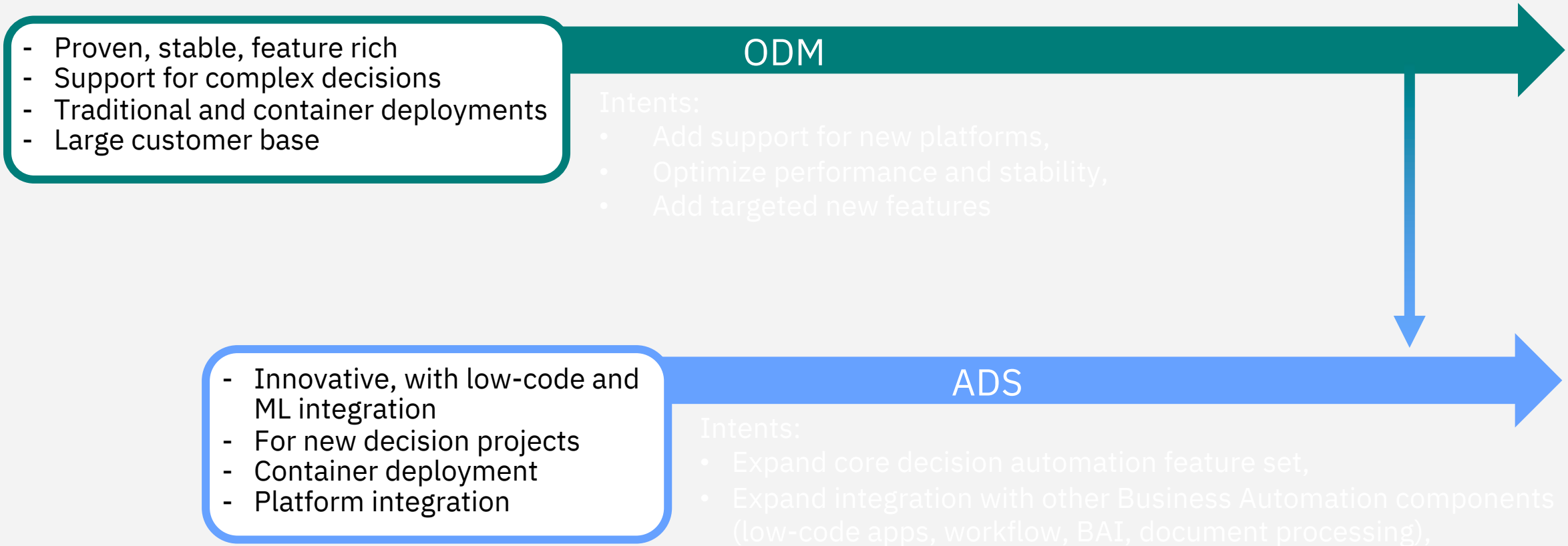
- Example 1: Processing and writing business data or common data
- Example 2: Writing time series to dedicated Elasticsearch indices based on the ruleset path
- Example 3: Filtering out data
- Example 4: Obfuscating data

https://www.ibm.com/docs/en/cloud-paks/cp-biz-automation/21.0.x?topic=walkthrough-examples

ADS and ODM positioning



ADS & ODM are evolving side by side



ODM best when a project requires...

As of April 2021

- Large/complex decision services
  - With hundreds of rules organized in a hierarchy
  - With data models for rules based on Java models
  - With a need to combine business rules, script-based actions and orchestration of tasks
- Reuse of existing ODM rules and ruleflows
- Deployments on app servers, embedded in Java apps, on compute grids, on z/OS
- Built-in testing and simulation capabilities
- Advanced runtime management capabilities

(1): Deprecated

ADS best when a project requires...

As of April 2021

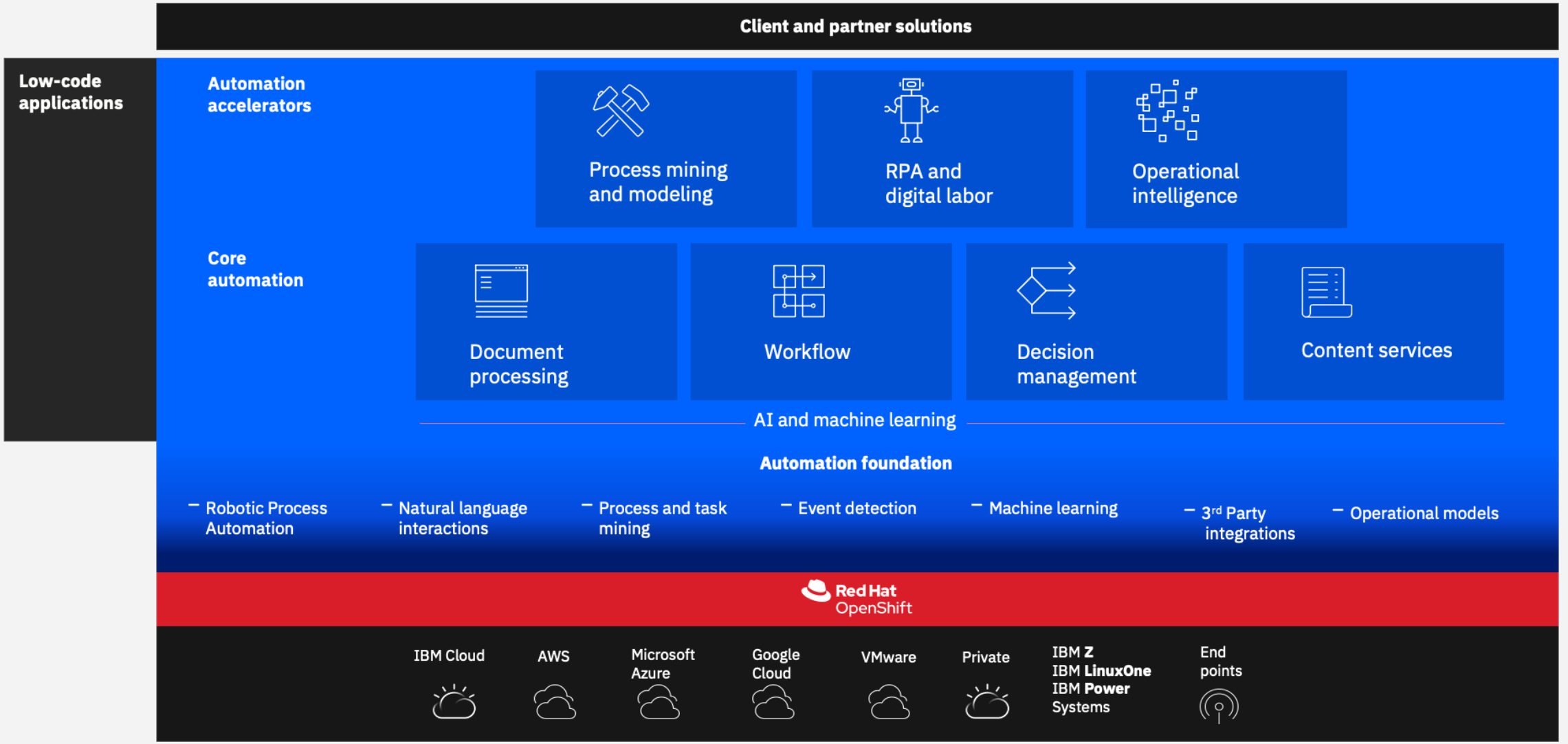
- New decision automation led by business groups
- Intuitive decision modeling and data models definition
- Built-in integration of Machine Learning predictions
- Usage of Git as the repository and driver for governance
- Ease of integration with 3rd party CI/CD pipelines
- Native cloud architecture
- Integration with other automation components

Definitions / Terms

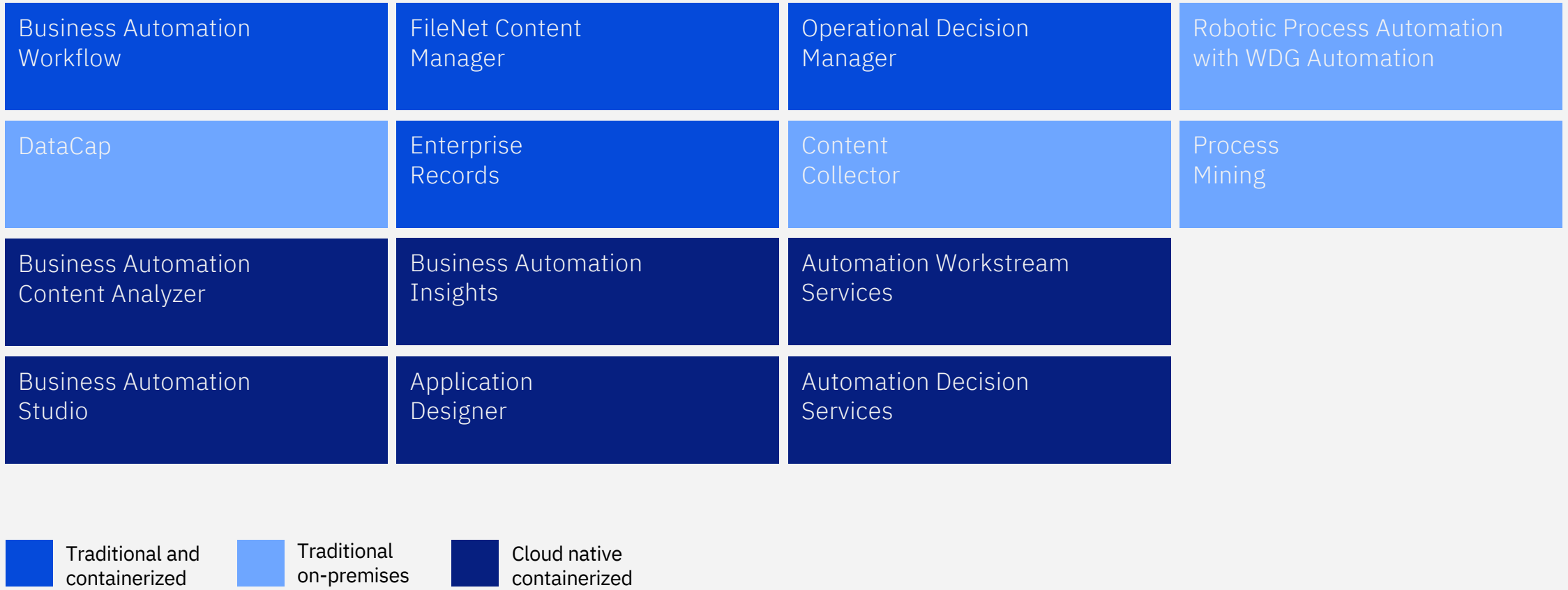
- Projects
- Business Automations
- Automation Services
- Applications
- Decisions
- Document Processing
- Workflows
- External Automation Services

- **Project Types**
  - business application (application)
  - business automation (automation)
    - Decision automation
      - decision-modeling capabilities
      - capture and automate repeatable decisions
      - “Automated Decision Services”
    - Document processing automation
      - Content models to extract and classify data from business documents
      - Content Analyzer
    - External automation
      - Existing services created from traditional products outside Business Automation Studio
    - Workflow automation
      - Process and case definitions
  - template
    - starting point to create applications
    - Composed of applications, actions, views, and business objects, can reference one or more toolkits
    - 3 sample templates are included
  - toolkit
    - shared artifacts to create applications
    - libraries (“building blocks”)
    - contain views (UI widgets), actions, and business objects

IBM Cloud Pak for Business Automation



Cloud Pak for Automation: Components and deployment options

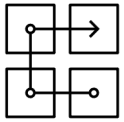


IBM Cloud Pak for Business Automation: Core automation

Document processing

Capture, classify, and extract data from content

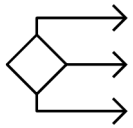
- Speed extraction of data
- Reduce data entry errors
- Gain insights from unstructured documents



Workflow

Design and manage start-to-finish workflows

- Choreograph human and automated activities
- Improve consistency across business operations
- Increase straight-through processing



Decision management

Automate decisions with business rules

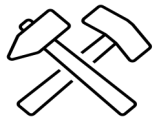
- Rapidly adapt to business change
- Increase consistency and auditability of decisions
- Integrate with predictive analytics

Content services

Share, manage and collaborate on content

- Instant access to content
- Connect content to digital business applications
- Assure governance and compliance

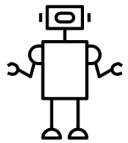
IBM Cloud Pak for Business Automation: Automation accelerators



Process mining and modeling

Understand and analyze your processes

- Understand existing process and task flows
- Analyze impact on key performance indicators (KPIs)
- Simulate future processes using “what-if” analysis



RPA and digital labor

Use bots to automate routine human tasks

- Automate repetitive activities
- Eliminate copy-and-paste and data-entry errors
- Free employees for higher-value work

Operational intelligence

Gain insights with built-in AI

- Capture data generated by operational systems
- Apply AI and machine learning to provide insights
- Make adjustments to improve business operations

IBM Business Automation Reference Architecture

Workflow Management
- IBM Business Automation Workflow

Content Management
- IBM FileNet Content Manager

Data Capture
- IBM DataCap on Cloud
- IBM Business Automation Content Analyzer

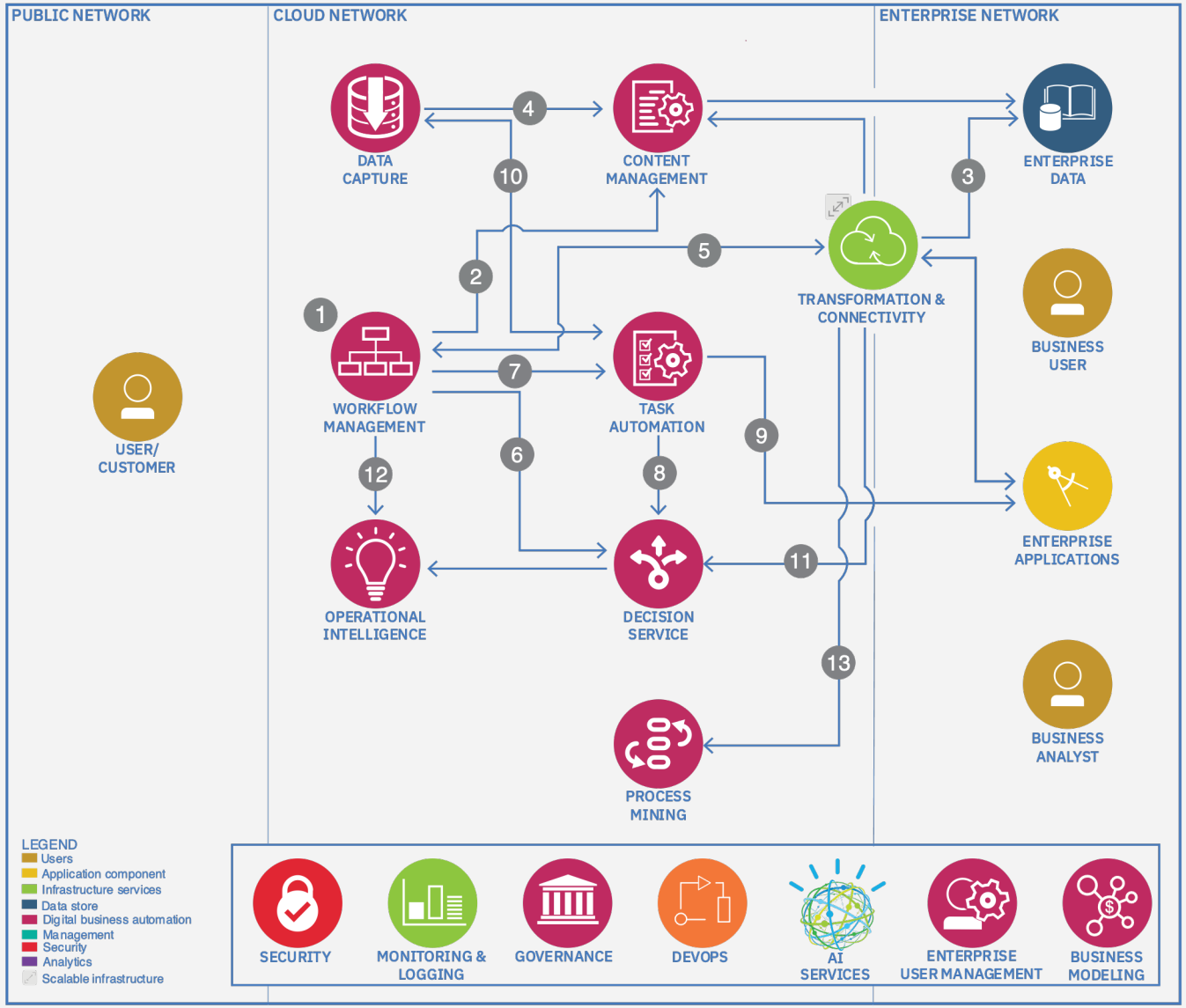
Transformation & Connectivity
- IBM DataPower Gateway
- IBM App Connect

Task Automation
- IBM Robotic Process Automation

Decision Service
- IBM Operational Decision Manager

Operational Intelligence
- IBM Business Automation Insights
- IBM Business Automation Workflow

Process Mining
- IBM Process Mining



Deprecated and removed features

Deprecated feature	Module	Recommended migration	Deprecated	Removed
Decision Server Insights	Decision Server Insights	None	Operational Decision Manager V8.10.5.1	
Decision Center Enterprise console		Decision Center Business console	Operational Decision Manager V8.10.5	
Decision Center modeling decision services	Decision Center Business console	Automation Decision Services	Operational Decision Manager V8.10.5	
Decision Center Enterprise consoleSupport for IBM Integration Bus	IBM Integration Bus	Manually define IBM Integration Bus events in the business model.	Operational Decision Manager V8.10.4	
Global entity aggregates	Decision Server Insights	Use shared aggregates.	Operational Decision Manager V8.10.0	
Predictive scoring agents	Decision Server Insights	Use Java agents.	Operational Decision Manager V8.10.0	
Java™ Management Extensions (JMX) public API for RuleApp and ruleset management in Rule Execution Server	Decision Server Rules	Use session management for local or the REST API for remote use.	Operational Decision Manager V8.10.0	
IBM WebSphere MQ V7.5	Decision Server Insights	Use IBM WebSphere MQ V8.0 or V9.0.		
Support for IBM DB2 10.5 for Linux, UNIX and Windows	All modules	Use IBM DB2 11.1 for Linux, UNIX and Windows.		

Refer https://www.ibm.com/docs/en/odm/8.10?topic=manager-deprecated-removed-features for complete set of deprecated and removed features.

Deprecated and removed features

Deprecated feature	Module	Recommended migration	Deprecated	Removed
Support for IBM DB2 10.5 for Linux, UNIX and Windows	All modules	Use IBM DB2 11.1 for Linux, UNIX and Windows.	Operational Decision Manager V8.9.1	
Support for Java 7	All modules	Use Java 8.	Operational Decision Manager V8.9.1	Operational Decision Manager V8.10.0
Enterprise JavaBeans (EJB) API for Rule Execution Server	Decision Server Rules	Use POJO rule sessions.	Operational Decision Manager V8.9.1	Operational Decision Manager V8.10.0
Message-driven rule beans (MDB) API for Rule Execution Server	Decision Server Rules	Use POJO rule sessions.	Operational Decision Manager V8.9.1	Operational Decision Manager V8.10.0
Custom business rule languages	Decision Server Rules and Decision Center	The recommended approach is to use the business action language. If this is not sufficient, consider technical rules.	Operational Decision Manager V8.8.1	
Rule templates	Decision Server Rules and Decision Center	Copy and paste rule artifacts in the Decision Center Business console.	Operational Decision Manager V8.8.1	
Decision trees	Decision Server Rules and Decision Center	Use decision tables or ruleflows.	Operational Decision Manager V8.8.1	
Classic rule projects	Decision Server Rules and Decision Center	V8.8.0 replaces classic rule projects with decision services.	Operational Decision Manager V8.8.0	
Decision Validation Services	Decision Server Rules and Decision Center	Use testing and simulation features in the Decision Center Business console.	Operational Decision Manager V8.8.0	

Refer https://www.ibm.com/docs/en/odm/8.10?topic=manager-deprecated-removed-features for complete set of deprecated and removed features.

- Tools for modelling Client-side human services
  - Coach
  - Client-side script
  - Service
  - Nested client-side human service
  - Event Handler
    - Error Event
    - Data Change Event
  - Exclusive Gateway
  - Intermediate Event
  - End Event