

**COMP208**

**BRFplus for ABAP**

The Framework for Business Rules



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# Agenda



1. **About Business Rules**
2. Quick Demo of BRFplus
3. BRFplus Features and Components
4. Scenario: Insurance Eligibility and Pricing
5. Connectivity
6. Further Information

# A little bit about Business Rules...



**“Business rules or business rule sets describe the operations, definitions and constraints that apply to an organization in achieving its goals.”** (Wikipedia)

- Business rules represent the policies, guidelines that drive operational business decisions
- Business rules are owned by Business, not by IT

## Examples for Business Rules

Validation Rules	Claim Validation, Loan Application Validation
Rate Calculation Rules	Computation of Taxes, Interest Rates, Sales Commissions, Premiums, Bonuses, Duties
Decision Rules	<ul style="list-style-type: none"><li>■ Is Applicant Eligible for a Loan Product</li><li>■ Can this good be cleared by Customs?</li></ul>
Recommendation Rules	Marketing Promotions, Medical Recommendations, Online Product Chooser
Personalization Rules	Website Personalization, Product Personalization , Relationship Personalization
Internationalization and Localization Rules	<ul style="list-style-type: none"><li>■ International Products e.g. Maintaining similar Insurance products across countries</li><li>■ Cross border Custom Duties</li></ul>
Exceptions and Special Rules	Exceptions, Special Accounts , Special Arrangements, etc.
Optimization and Configuration Rules	Product Configuration, Deal Configuration

## Business Rules are expressed in

- text rules (if ... then ... else ...)
- decision tables/trees
- formulas

# Examples from across Industries



## Rules are Ubiquitous. Rules are Everywhere !!

<b>Telecom</b>	<b>Content Based Customizable Billing</b>
<b>Insurance</b>	<b>New Products, Claims Settlement, Agent Commissions</b>
<b>Mortgage</b>	<b>Eligibility, Pricing, Underwriting</b>
<b>Logistics &amp; Shipping</b>	<b>Parts Management, Duties Calculations, Pricing Calculations</b>
<b>Public Sector</b>	<b>Tax Calculations, Customs Duties, Land Regulations, License Fee Calculations</b>
<b>Stock Exchanges</b>	<b>Alert Engines</b>
<b>Education</b>	<b>Fee Calculations, Course Selections</b>
<b>CRM</b>	<b>Quotations, Campaigns, Discounts, Recommendations, Pricing, Cross Sell</b>
<b>HealthCare</b>	<b>Claims, Patient Monitoring, Fraud Detection</b>
<b>Banking</b>	<b>Relationship based Pricing, Scorecards, Credit Decisioning</b>

# Enforcing Business Rules – Conventional Methods

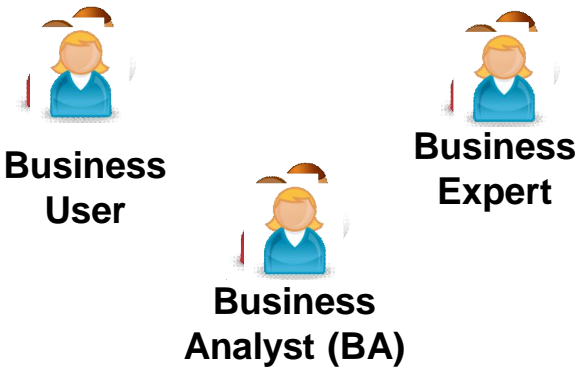
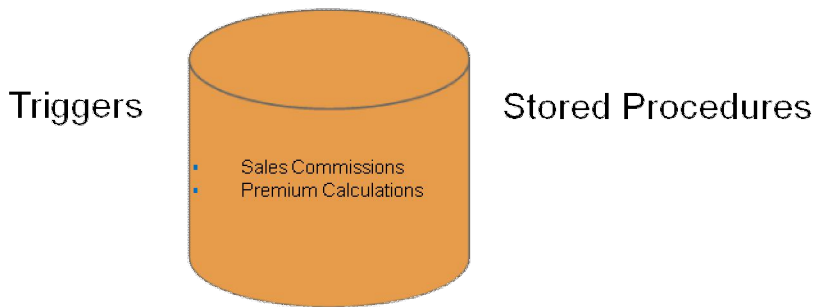


## Automated Enforcement

## No/Semi Automation

Rules inside Databases

Rules as Tacit Knowledge



Rules in Code

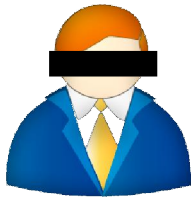
Rules In Documents

```

GET_LIABLE_PARTIES In:
METHOD ge
IF iv_c
IF iv_claim硬件_symptom EQ 'Wrong parts in kit'
rv_string = 'Forwarder'.
ELSEIF iv_claim硬件_symptom EQ 'Parts missing'.
rv_string = 'Forwarder'.
ENDIF.
ELSEIF iv_claim_reason_code EQ 'Damaged in transit'.
IF iv_claim硬件_symptom EQ 'Parts are damaged'.
rv_string = 'Forwarder'.
ELSEIF iv_claim硬件_symptom EQ 'Hardware error'
rv_string = 'Forwarder, Manufacturer'.
ENDIF.
ENDIF.
ENDMETHOD.
    
```



# Typical Customer Challenges



## Zero visibility into business decisions

- Critical business rules are locked in code or databases
- Business has no visibility into how systems take decisions

## Change resistant IT systems

- Business rules can be very volatile
- Hardwired business rules make change difficult for IT
- Unacceptably long testing and change cycle times
- High costs of correction and rework

## Inefficient and Costly Human Experts

- Need to maintain a pool of trained experts
- Continuous training and hiring costs
- Very complex rules and error prone & time consuming human decision making

## Scattered knowledge

- Business rules not centrally managed
- Scattered across code, manuals and as tacit knowledge
- Inadequate, ambiguous and inconsistent business rules across the Enterprise
- High risk of compliance violation

## How is it achieved?



### **Can't we just have faster application development lifecycles?**

- What to change?
- Where to change?
- Test the application
- Perform unit tests, functional tests, integration tests

### **With Business Rules Frameworks**

- Provide a constrained environment for change
- Enable Business Users to change
- Provide integrated testing; impact of change is clear
- Clear inputs and clear outputs
- Rules are versioned and are auditable and are self documenting
- **"Empower" users to feel comfortable about making the change**



# How do you "Empower" business users..?



## **Empowerment of business users**

- Provide a lifecycle management for rule changes.
- Provide integrated testing and simulation capabilities.
- Provide easy to use user interfaces and "Not Code".
- Provide expressive concepts such as decision tables, decision trees and if-then rules for modeling business rules.

# Examples of Business Rules..



## Decision Table

Resident Type		Local Resident	Non Local Resident
Principal Loan Amount	Loan Period	interestrate	interestrate
< 15000	12	10.75	11.75
	24	10.50	11.50
	36	10.25	11.25
	48	10.00	11.00
	60	09.75	10.75
Between 15000 and 50000	12	10.50	11.50
	24	10.25	11.25
	36	10.00	11.00
	48	09.75	10.75
	60	09.50	10.50
Between 50000 and 150000	12	10.25	11.25
	24	10.00	11.00
	36	09.75	10.75
	48	09.50	10.50
	60	09.25	10.25
Between 150000 and 500000	12	10.25	11.25
	24	10.00	11.00
	36	09.75	10.75
	48	09.50	10.50
	60	09.25	10.25

## IF-THEN Rule

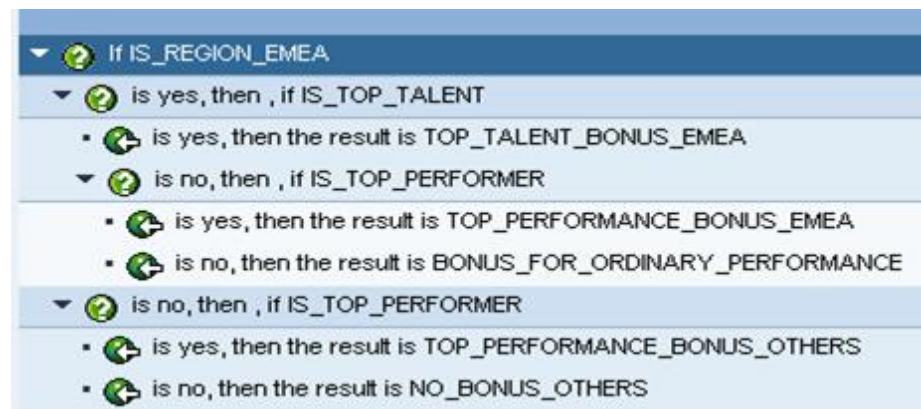
**(2) Gender Check - Unlimited Validity**

Unlimited Validity  
Description: Gender Check

**If** GENDER  is initial  **OR**  
 ( GENDER  is not equal to  Male  **AND**  
 GENDER  is not equal to  Female  )

**then** Log Message: Please provide proper gender details.

## Decision Tree



## Higher degree of transparency

- Explicit documentation of business practice decisions instead of secrets kept in code or some people's heads
- Better understanding and predictability of application behavior
- Decreased maintenance and testing costs because business rules are decoupled from application code
  - business users can modify, test and simulate
  - reduction in modification cycle time
  - quicker response to changing conditions
  - no downtime, no code change needed
- Improved administration of business practice decisions because of change history and clear ownership of rules

## Faster development by modeling approach

- SAP applications
- Partners and customers in composite scenario

## Convenient graphical representation

- Rules can be displayed in the most practical and natural way
  - Decision Tables
  - Decision Trees
  - Flow Models
  - Scorecards
  - Text Rules

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1. About Business Rules
- 2. Quick Demo of BRFplus**
3. BRFplus Features and Components
4. Scenario: Insurance Eligibility and Pricing
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# Quick Demo of BRFplus

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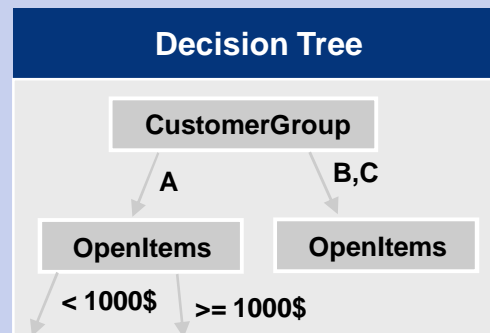


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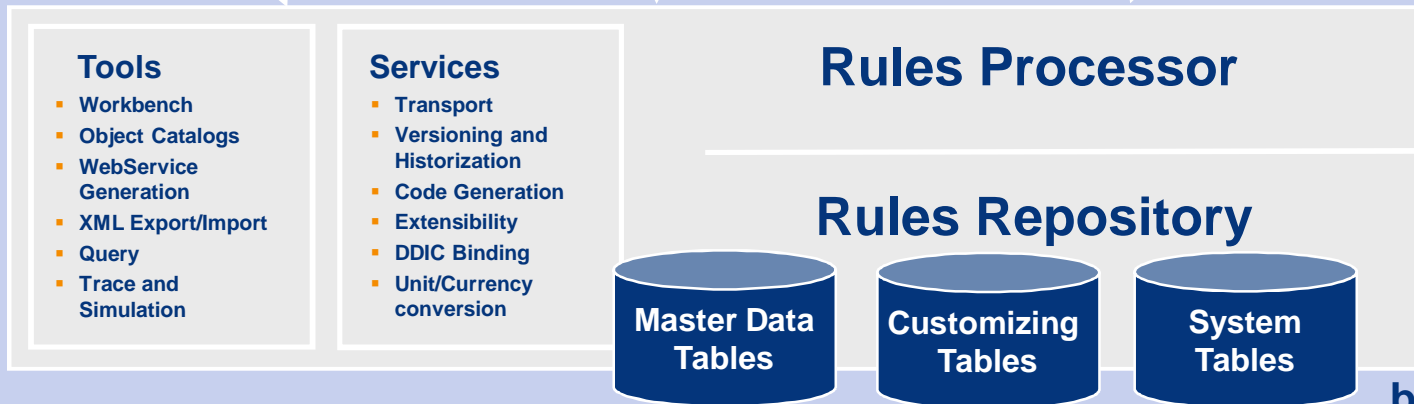
## BRFplus

Decision Table		
Amount	Transaction	CheckType
0\$..100\$		None
> 100\$	Internal	None
> 100\$	External	4-Eye



Formula			
(Quantity * 1.19) + ServCharge			
7	8	9	/
4	5	6	*
1	2	3	-
0	+/-	,	+

front-end



back-end

# Functional Mode of Operation



## Application Code

```

lo_factory = cl_fdt_factory=>if_fdt_factory~get_instance(
lo_function = lo_factory->get_function( lv_function ).
lo_context = lo_function->get_process_context( ).
lo_context->set_value( iv_id = lv_object_id
                    ia_value = lv_value ).
lo_function->process( EXPORTING io_context = lo_context
                   IMPORTING eo_result = lo_result ).
lo_result->get_value( IMPORTING ea_value = lv_result ).
    
```

Application code processes BRFplus function

## Function

Context  
Result

BRFplus function processes assigned expression

## Expression Decision Table: Bonus Determination

Monthly Salary	Role	Employee ID	Current rating	Bonus Payment	Stock Options
			Does Not Meet Expectations	0 USD	
<2000 USD			Consistently Exceeds Expectations	1500 USD	
<2000 USD			Exceeds Expectations	1000 USD	
<2000 USD				750 USD	
<3000 USD			Consistently Exceeds Expectations	2000 USD	
<3000 USD			Exceeds Expectations	1500 USD	
<3000 USD				1000 USD	
		D034314		25000 USD	10000
	Developer			result of 1.09 * Monthly Salary * Performance Factor	100
	Senior Developer			result of 1.1 * Monthly Salary * Performance Factor	500
	Development Architect			result of 1.15 * Monthly Salary * Performance Factor	1000
	Chief Development Architect			result of 1.2 * Monthly Salary * Performance Factor	5000

Expressions process sub expressions

## Expression Formula: Bonus Calculation

Formula:  $1.09 * \text{MONTHLY SALARY} * \text{PERFORMANCE FACTOR}$



# Event Mode of Operation



## Application Code

```
lo_factory = cl_fdt_factory=>if_fdt_factory~get_instance(  
lo_function = lo_factory->get_function( lv_function ).  
lo_context = lo_function->get_process_context( ).  
lo_context->set_value( iv_id = lv_object_id  
ia_value = lv_value ).  
lo_function->process( EXPORTING io_context = lo_context  
IMPORTING eo_result = lo_result ).  
lo_result->get_value( IMPORTING ea_value = lv_result ).
```

## Function

Context  
Result

Application code  
processes BRFplus  
function

BRFplus function  
processes rules from  
assigned rule set(s)

Rules can change context and  
start actions

## Ruleset: Risk Check

Enabled Rule Set  Rule Set contains 2 Rules

Ruleset will be triggered when RISK\_CHECK  is processed

Ruleset will be processed at position

Rules
<input checked="" type="checkbox"/> (1) Age Check 2008 - Validity: 01.07.2008 - 31.12.2008 <span>Rule Operations</span>
<b>if</b> AGE <input checked="" type="checkbox"/> is less than 25 <input checked="" type="checkbox"/> and unless is greater than 65 <input checked="" type="checkbox"/> <b>then</b> Change Parameter Value of: RISK_GROUP to Premium <b>else</b> <not assigned> <input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> (2) Age Check 2009 - Validity: 01.01.2009 - Unlimited <span>Rule Operations</span>

# Some Expression Types



<b>Boolean</b>	<b>Boolean arithmetic supporting any number of operands, parenthesis, AND, OR, NOT</b>
<b>BRMS Connector</b>	<b>Connects BRFplus with SAP NW BRM or partner products</b>
<b>Case</b>	<b>Mapping of cases with results; “when ... then ..., when ... then ...”</b>
<b>Database Lookup</b>	<b>Performs a database select to retrieve values for processing</b>
<b>Decision Table</b>	<b>Sequentially processes a table of value ranges and returns the first row/all rows for which all ranges returned true</b>
<b>Decision Tree/Search Tree</b>	<b>Traverses a binary/non-binary tree with nodes being conditions and leafs being results</b>
<b>Formula</b>	<b>Allows the definition of complex formulas to be evaluated at run-time</b>
<b>Random Number</b>	<b>Gets a random number or determines whether a certain probability is met</b>
<b>Static ABAP Method</b>	<b>Calls a static ABAP method of a class that implements a specific interface</b>
<b>Step Sequence</b>	<b>Sequentially processes a number of expressions/functions keeping all available values (context / results) in a central work area</b>
<b>Value Range</b>	<b>Checks whether a certain value lies within a value range</b>

BRFplus allows to define new expression types, most features and services can be reused

## Initial Shipments

- SAP NW 7.0 Enhancement Package 1
- Integrated into many SAP applications

## Development Language

- Backend: ABAP Objects
  - comprehensive API to define and evaluate Business Rules
- User Interface: WebDynpro for ABAP
  - standalone and reuse UIs

## Customer/Partner Enhancements

- User interface is based on Model-View-Controller paradigm
- Backend and user interface are modular
  - Backend: usage of customer defined expression types easily possible
  - User Interface: configuration of screens, development and replacement of screens possible
  - User Interface: stand alone usage or embedding into another application possible

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## Objective

To ascertain eligibility and obtain a premium quote for the selected insurance product, given his/her basic demographic details.

## Eligibility

- Determination of the eligibility status of the insurer from his demographic details
  - Check for completeness of required mandatory details
  - Validation of given inputs and provide error messages

## Pricing

- Calculation of the premium quote for the insurer for the chosen insurance product and the face amount
  - Risk class categorization based on the health status of the insurer
  - Calculation of premiums



# Scenario

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## Benefits

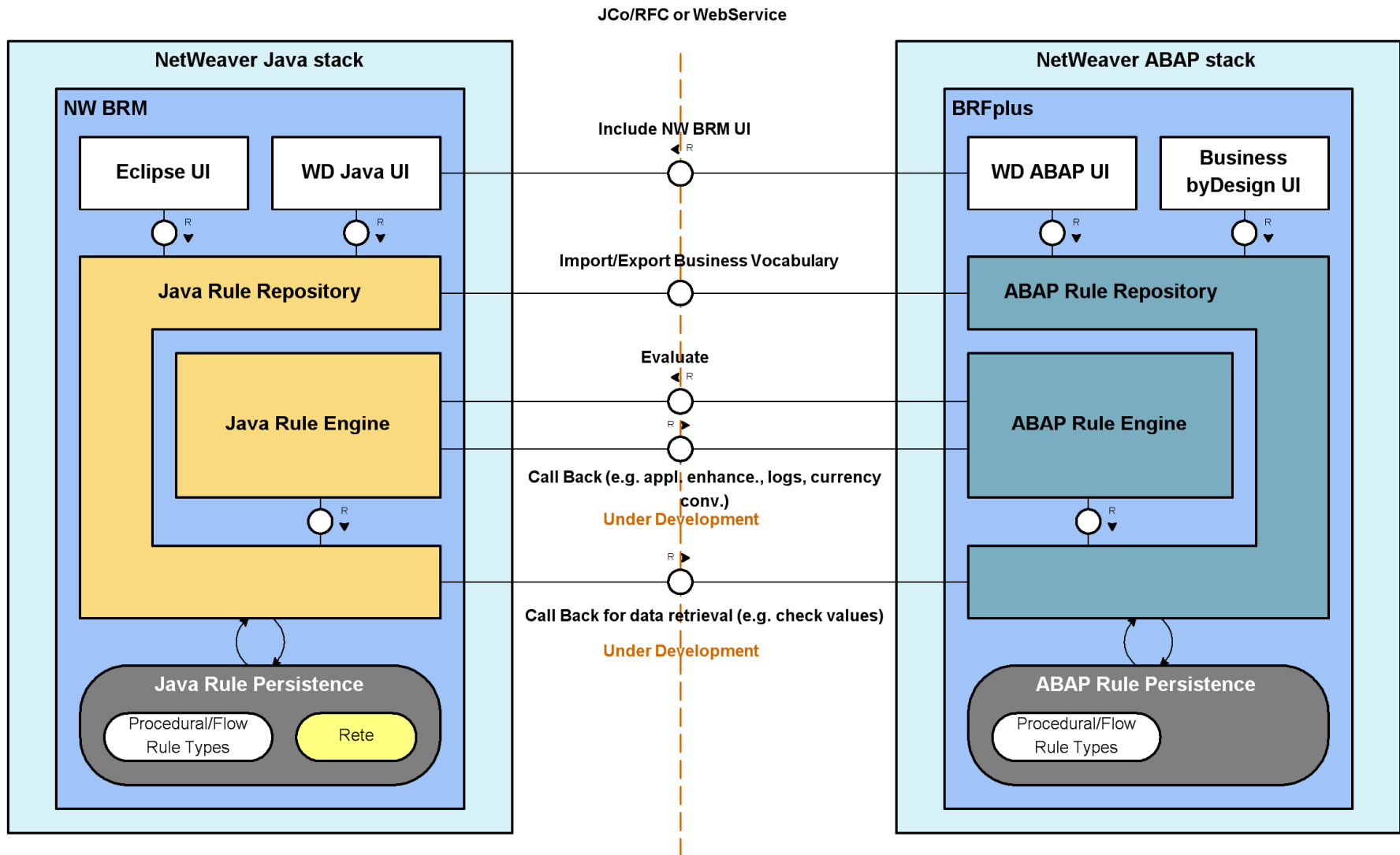
- Connection with NW BRM or any other BRMS possible
  - enables usage of existing BRMS
  - enables use of very specialized BRMS
- Connection between ABAP and Java stack

## Features

- Connects external rules engines and NW BRM with BRFplus
- Communication based on RFC/JCO and Web Services
- Allows you to export the BRFplus design time information (XML Schema)
- Provides runtime data exchange (XML)
- Built-in integration with NW BRM for Java



# Connectivity Architecture BRFplus - BRM





## BRFplus

- 1 Create an expression of type BRMS Connector
- 2 Specify the signature of the call - inputs/outputs
- 3 Get the generated schema for the vocabulary

## NW BRM

- 4 Import the vocabulary into NW BRM or external rule engine
- 5 Deploy the rules into AS Java

# How does the modeling of rules happen?



1

## Create an expression of type BRMS Connector

BRMS Connector **CALLNWBRM** Display Active

[Back](#) [Change <-> Display](#) [Save](#) [Check](#) [Activate](#) [Transport](#) [Delete](#) [Change Status](#)

### General

Name:  Short Text:

Application: [KMD\\_RULES\\_V2](#) Access Level:

[Show More](#)

### Detail

[Show Result Data Object](#)

Connection Type:

Function Module:

Destination:

Base Currency:

[Connection Parameters](#) [Signature](#)

#### Connector Call Parameters

[Add Row](#) [RemoveRow](#)

Name	Value
project	demo.sap.com-kmdrulespoc
ruleset	Wage Calculations Rules

# How does the modeling of rules happen?



2

## Specify the signature of the call - inputs/outputs

Connection Parameters    Signature

Context

Add Existing Object    Add New Object    Remove Object

Name	Text	Parameter Type	Object Type
<u>HOURLMAX</u>	Max Wage Per Hour	Exporting	
<u>MATERNITY_WAGE_HOUR</u>	Maternity Wage PerHr	Exporting	
<u>NORMAL_WAGE_HOUR</u>	Normal Wage Per Hour	Exporting	
<u>WEEKMAX</u>	Week Max Wage	Exporting	
<u>WORKMINUTES_DAY</u>	Work Minutes in Day	Exporting	

# How does the modeling of rules happen?



3

## Get the generated schema for the vocabulary

```
-<xs:annotation>
  <xs:appinfo>Input Elements</xs:appinfo>
</xs:annotation>
-<xs:sequence>
  -<xs:element name="HOURMAX" type="FDTNS:AmountType">
    -<xs:annotation>
      +<xs:appinfo></xs:appinfo>
      <xs:documentation xml:lang="EN">Max Wage Per Hour</xs:documentation>
    </xs:annotation>
  </xs:element>
  -<xs:element name="MATERNITY_WAGE_HOUR" type="FDTNS:AmountType">
    -<xs:annotation>
      +<xs:appinfo></xs:appinfo>
      <xs:documentation xml:lang="EN">Maternity Wage PerHr</xs:documentation>
    </xs:annotation>
  </xs:element>
  -<xs:element name="NORMAL_WAGE_HOUR" type="FDTNS:AmountType">
    -<xs:annotation>
      +<xs:appinfo></xs:appinfo>
      <xs:documentation xml:lang="EN">Normal Wage Per Hour</xs:documentation>
    </xs:annotation>
  </xs:element>
  -<xs:element name="WEEKMAX" type="FDTNS:AmountType">
```



## BRFplus

- 1 Backend calls BRFplus
- 2 BRFplus creates XML for input data conformant with generated XSD
- 3 BRFplus calls java rule engine passing xml data (JCO)

## NW BRM

- 4 Use the schema for rule definition.
- 5 Java rule engine returns data to BRF plus

## NW BRM

- 6 BRFplus returns ABAP data to backend



# Demo of BRFplus- NW BRM Connector

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## Expressiveness

- Expression and Action Type improvements (e.g. BRMS Connector, DB Lookup)
- New Expression and Action Types (e.g. Email Action, BPM Connector, Loop Expression)
- Better integration of Decision Tables/Trees into the Rule set
- Deep Context

## Workbench

- Merge of Catalog and Repository
- Simplifications/Usability improvements
- New and improved Tools (e.g. for versioning)
- Excel import and export (for decision table data or test data)
- UI Configuration

## Miscellaneous

- Rule Debugger for non-developers
- Migration tools for migration to BRFplus
- Runtime Trace improvements
- Optimization of generated code

## Further Information



### → SAP Public Web:

SAP Developer Network (SDN): [www.sdn.sap.com](http://www.sdn.sap.com)

Business Rules in SDN: <http://www.sdn.sap.com/irj/sdn/nw-rules-management>

Business Process Expert (BPX) Community: [www.bpx.sap.com](http://www.bpx.sap.com)

### → SAP Online Help

<http://www.sap.com/education/>

### → Related Workshops/Lectures at SAP TechEd 2008

- BPM101, Overview of Business Rules Management with SAP NetWeaver CE, Lecture
- BPM201, Build the Business Rules Once and Let the End User (Business) Manage Them, Lecture
- BPM260, The ABC's of Modeling and Using Business Rules in SAP NetWeaver CE, Hands-on
- BPM262, How to Use Business Rules With Business Process Management, Hands-on

Thank you!

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