Business Rule Framework Plus in SAP – A Brief walkthrough
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Abstract

This Document describes the Business Rules Framework Plus (BRFPlus) in SAP. The Document states the introduction of Business Rule Management System (BRMS), Different Expressions in BRFPlus, Steps needs to start working on BRFPlus and step by step approach for creation of an application in this new framework and calling the application from an ABAP Program.
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1. BUSINESS RULE MANAGEMENT SYSTEM (BRMS)

BRMS is a software system used to define, deploy, execute, monitor and maintain the variety and complexity of decision logic in the form of Business Rule that can be used by operational systems within an Organization.

1.1 Business Rules at SAP:

There are many tools, engines, frameworks which have been given by SAP over the past 20 years however most of them do not claim to be a Business Rule Management System (BRMS), though to some degree they offer functionality that is comparable to BRMS. Some of the applications given by SAP, which serves the purpose of BRMS to an extent, if not fully, are:

- Condition Technique
- Derivation Rule
- Formula Builder (Fobu)
- Rule Modeller
- Validation, Substitution, Rules (VSR)
- Workflow Rules

In 2005 SAP investigated the usage of business rules in new technology platform for SAP business and began the development of a general BRMS (Business Rule Management System) which is known as BRFPlus today. In the earlier releases the transaction code to access the BRMS was FDT_WORKBENCH which was then changed to BRFPlus in the subsequent release.

1.2 BRFPlus:

BRFPlus was first released in SAP NetWeaver 7.0 in 2006. Second release was done in SAP NetWeaver 7.0 enhancement pack 1 however the first two releases had certain limitations. SAP corrected the limitations of first two releases in BRFPlus and delivered it in enhancement pack 2.

BRFPlus provides its user an interface, the BRFPlus Workbench, in Web Dynpro ABAP technology. The workbench has the functionality for modelling, editing and managing business rules and related artifacts. The workbench as well includes search and navigation capabilities to find specific BRFPlus objects.

Currently BRFPlus is used in:

- SAP TM
- SAP CRM
- SAP Business by Design

1.2.1 Prerequisites for using BRFPlus:

BRFPlus is a part of SAP NetWeaver ABAP Server and is available immediately. For using BRFPlus one needs to have a system with SAP NetWeaver 7.0 enhancement pack 2 or higher.
Following WebDynPro services needs to be activated using transaction code SICF:

/SAP/BC/WEBDYNPRO/SAP/ FDT_WD_WORKBENCH
/SAP/BC/WEBDYNPRO/SAP/ FDT_WD_OBJECT_MANAGER
/SAP/BC/WEBDYNPRO/SAP/ FDT_WD_CATALOG_BROWSER

SAP_BC_FDT_ADMINISTRATOR is the role for BRFPlus administrators. Restrictions on the authorization object level can be controlled by the SAP Security team.

With this setup, you are ready to work on this BRMS tool. Transaction code to access this tool is BRFPlus or BRF+.

1.2.2 Important Objects in BRFPlus:

Below are the important objects defined in BRFPlus:

- **Application**: An application is a container to organize and manage the BRFPlus objects. The application can be compared with a package in ABAP or a project as used in several developments.

- **Function**: Function is the business rules service interface. Function defines inputs/Outputs and thus acts as a contract between the caller and the business logic implemented within the rules.

- **Data Objects**: Data objects are the data carriers and describe the data types. Data objects can be of type Data element, Structure, and Table.

- **Ruleset**: Ruleset is collection of rule. One ruleset can be assigned exactly to one function. There can be more than one ruleset assigned to a function and in such case priority can be assigned to ruleset from 01 (Highest Priority) till 99 (lowest priority). In such a case ruleset with higher priority is executed first. Also Ruleset can have preconditions which can decide when and how rule would be executed.

- **Rules**: While Ruleset organize which rules are evaluated, the business logic is built in the rules. Rules are self-contained objects and can be maintained into a Ruleset or can be executed standalone.

- **Expressions**: Expression uses some input to calculate or derive some output. BRFPlus comes with a set of common expressions and is being enhanced regularly by SAP with the new expressions. Some of the common expressions in BRFPlus are BRMS Connector, Decision Table, Decision Tree, Case etc. etc.

- **Actions**: An instance of an action type is called an action. Action types define the interactive part of BRFPlus. They can be regarded as a special kind of expression types. Only a few generic action types come with BRFPlus like:

  - **Send Email**: Sends email to a specific user or mailing list
Procedure Call: Call an ABAP procedure like method or FM
Log Message: Writes a message into message log
Start Workflow: Triggers a business workflow
Workflow Event: Raises a Business Workflow event

2. **STEP BY STEP APPROACH TO CREATE AN APPLICATION:**

Below steps would explain the steps to create a BRFPlus application for Price Calculation for some of the items and integration of the application with ABAP Code.

During this course it would be explained to create Items, maintain discounts and rules to apply the discounts.

2.1 **Create an Application:**

Create the same by clicking on the button create application.

*Figure 1: Create Application*
This should open a dialog box where we need to give the name of the application, storage type and Development package.

*Figure 2: Define Application Properties*

Once relevant details are given, click on create and navigate button as shown on the above screen.

With this, application object DEMO_PRICING_APPLICATION has been created. Now activate the created application by clicking on activate button.
2.2  Create a Function:

Once application has been created and activated one need to create the object under this application. The objects could be any BRFPlus object like Function, Rule set, Decision Table, Expression Type etc.

As shown in below screen, first create a function under the application created in previous steps.
After clicking the create button, below pop up appears where one need to give the name of the Function and Description as shown below. After filling in the details click on button “Create And Navigate to Object”.

To allow the subscription of Rulesets, the function should run in the event mode which as well is the system default mode.
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**Figure 6 Function Mode**

Click on signature tab of function and click on add multiple elements.

**Figure 7 Add Elements to Function**
Figure 8 Define Element Properties

After clicking ok, system navigates back to the function screen with recently added elements.

Figure 9 Elements created in Function

Save the function and then click on the context elements one by one to change their properties as per the requirement of the application.
Change the default length of the components as per the need of application:

Customer: Change default length of 255 to 25

Item: Change default length of 255 to 25

Promo: Change default length of 255 to 20

Price: As this is a number, we need to keep the value to keep the length 7 with 2 decimal places.

Apart from this for elements ITEM and Promo, one needs to create values. Three items are created for this application which is Computer, Laptop and Phone for our example.

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**Figure 10 Change Element Properties**

**Figure 11 Create Item Values**
On the similar line adapt the properties of Promo element and create elements as shown in below screen.

**Figure 12 Items Created**

Now create the result object which would store the Net Price of an Item in the pricing application.

**Figure 13 Promotional Discount Values Created**

**Figure 14 Create Result Data Object**
With the creation of the Result element “NET_PRICE” creation of the Function acts as an interface to the rules is complete.

To ensure that every thing has been done correctly, do a check on the objects and at the same time activate them.
2.3 RuleSet Creation:

To create a ruleset, rightclick on the application and then select create ruleset OR create the ruleset from the function directly by clicking on button “Create Ruleset”.

![Create Ruleset for the function](image1)

Figure 16 Create Ruleset for the function

Name the ruleset “Calculate_Price_Ruleset”.

![Define Ruleset Properties](image2)

Figure 17 Define Ruleset Properties
On clicking the button, Create and Navigate to Object, browser navigates to the created ruleset screen.

Figure 18 Created Ruleset
In next step create the ruleset variables which are Cust Discount and Promo Discount. Both these variables are the discount percentage and hence length is 3 digits and 2 decimal places. These variables can store only positive values.

**Figure 19 Create Ruleset Variable**
The variables created in Ruleset will be initialized with respective discount values. Decision Table expression to be used for this purpose. Hence proceed to create the decision table.

**Figure 20 Create Expression in the Ruleset**

**Figure 21 Create Decision Table Expression**
The screen should like as below after creation of variables and decision tables in the ruleset.

![Figure 22 Ruleset screen after variable and decision table creation](image)

### 2.4 Rules:

To apply the right discount, Rule needs to be defined which will compare the values of Cust Discount and Promo Discount and higher discount value will be used to calculate the Net price of the item.

Proceed to create the rule in the ruleset created earlier. This needs to be done by clicking insert rule button in the rule set as shown in screen below.

![Figure 23 Create Rule: 1](image)

For comparison, select the menu entry “Use Value Range From” under the condition expression.
As shown below select the cust discount element for comparison as per the definition of this rule in the beginning. (Greater of two discounts needs to be applied in the Net Price).

Figure 24 Create Rule: 2

Figure 25 Create Rule: 3
Define the operation based on the condition. If condition mentioned in the IF clause is met, steps mentioned under the “THEN” part will be executed whereas if condition is not met, steps under “ELSE” part are executed.

Formula expression is used for calculating the Net Price Value.

In the expression creation dialog choose type as “Formula” and name of this formula can be “Use_Promotion_Discount”.

On the creation tab give the name and short text for formula expression. The formula which needs to be applied in this formula expression is:

\[
\text{Net Price} = \frac{\text{Price}}{1 + \text{Promo Discount}}
\]

As shown in the below screen, “Net Price” should be the result object for this formula expression.

Add the formula string from the context parameter box by directly clicking on the corresponding entry.
The division (/) and + operators can be added by clicking on the corresponding button. To enter the number, click on the number button and in the popup window one needs to enter the value (1 in this case) and then click ok to proceed further.

Now create another formula expression for the ELSE part of the ruleset in the same way as created for “Use_Promotion_Discount” formula.

This needs to be done by clicking on the button “Insert Exit Condition” with type as formula as shown below. Name of this formula expression would be “USE_CUSTOMER_DISCOUNT”.

![Figure 27 Create Formula Expression](image)

![Figure 28 Create Second Formula Expression](image)
2.5 Decision Table:
Earlier two decision tables were created with name CUST_DISCOUNT_DECISON_TABLE and PROMO_DISCOUNT_DECISION_TABLE. However, the design of these tables was not complete. Hence, now complete the pending decision tables.

Click on Decision Table CUST_DISCOUNT_DECISON_TABLE and browser navigates to screen to determine the table setting.

Select the Result Data Object. Since decision table is used to initialize the ruleset variable “CUST_DISCOUNT” hence select the element.

![Figure 29 Create Result Data Object for Decision Table](image)

After selecting the result data object, editor will ask to automatically update the results column of the table and one should confirm this request. For computation of customer discount, use two condition column in the decision table.

Select Insert Column under Condition columns and select elements “Customer” and “Item” as shown below.

![Figure 30 Insert Condition Column in Decision Table](image)
Once this is done, editor navigates to decision table main screen and there insert some data into the table by clicking on button “Insert New Row” under Detail section.

Enter the values in the table by clicking on links in the cell and then enter the values directly. Opt for direct entry because for this example only few data rows needs to be created however if there are number of data rows to be entered, this can be done from import of data from the excel sheet.

Important point to be taken into consideration is that the sequence of column in excel sheet should be same as defined in the decision table.
On the similar lines, table for Promotion Discount table PROMO_DISCOUNT_DECISION_TABLE needs to be created and data should be filled in as shown below.

<table>
<thead>
<tr>
<th>Product</th>
<th>Promo Discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product A</td>
<td>10%</td>
</tr>
<tr>
<td>Product B</td>
<td>15%</td>
</tr>
<tr>
<td>Product C</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Figure 34 Promotion Decision Table**

2.6 Check and Activation:

With the completion of data maintenance in decision tables, all the objects required for pricing demo application has been completed. Do a check and ensure that all the objects activated and all rules/rulesets has been enabled.

If a rule is disabled, one can find a button beside the same to enable it. One can set the validity of its rules based on the requirement. As shown below for this example, validity date has been set from 30.01.2013 to 31.12.2013.

**Figure 35 Activate the Rule**

One thing to note is that all the objects can be activated from the ruleset as all the objects created in this application reference to the ruleset “CALCULATE_PRICE_RULESET” directly or indirectly.

Activation of the object ensures that all the objects are syntactically correct and ready to be processed.
2.7 Simulation:
Now as all the objects are activated and are ready to be processed, run the simulation to confirm the expected behaviour of the function.

Figure 36 Start Simulation of the application
Below is the simulation screen which appears after clicking “Start Simulation”:

![Simulation Screen]

*Figure 37 Run Simulation*
Simulation can be in two modes:

**Shown Only Result**: This option displays the result of the simulation.

*Figure 38 Simulation in Show Only Result Mode*
Show also Results of Intermediate Steps: This mode of simulation is very helpful in case of trouble shooting as this mode displays all the intermediate steps and in case of problem one can identify the place of problem.

Figure 39 Simulation in “show results of Intermediate Steps”
Figure 40 Simulation in “show results of Intermediate Steps” Contd..

Figure 41 Simulation in “show results of Intermediate Steps” Contd..
2.8 Interface between Code and BRFPlus Function:
Following to be the code which is needed to call a BRFPlus application from your ABAP code:

"Get singleton instance of the FDT factory.
lo_factory = cl_fdt_factory=>if_fdt_factory~get_instance( ).

"get the function GUID according function name
ets_object_id = cl_fdt_persistence=>get_ids(  
    iv_object_type = 'FU'  
    iv_name = 'ZDEMO_PRICING_FUNC' ).

"get the function object
lo_function = lo_factory->get_function( id_result ).

"Context itself
lo_context = lo_function->get_process_context( ).

"Pass the input parameter values
lo_context->set_value (iv_name = 'CUSTOMER' "Customer  
    ia_value = lv_customer ).

lo_context->set_value (iv_name = 'ITEM' "Item  
    ia_value = iv_item ).

lo_context->set_value (iv_name = 'PRICE' "Price  
    ia_value = lv_price).

lo_context->set_value (iv_name = 'PROMO' "Promo  
    ia_value = iv_promotion ).

"Pass the parameter value structure and receive the result
lo_function=>process (EXPORTING io_context = lo_context  
    IMPORTING eo_result = lo_result ).

With the above code, lo_result variable returns the value of NetPrice of the product.

Important point to be noted is that the name of the field which needs to be passed to lo_context must have the same name as created in BRFPlus else the system does not recognize the data elements and gives a short dump.
3. REFERENCES

