Business Rule Maintenance Web Application

Documentation

Version 0.2

Content

The ruleengine can be extended for the two main concepts: checks and actions. By implementing a defined interface the developer can create new checks or actions. The resulting Java classes can then be added to the ruleengine jar file or to the Java classpath,

Overview

The Business Rules Maintenance web application allows to create, update and delete projects, rulegroups, subgroup, rules and actions. These are used to define and orchestrate a logic with the purpose to execute it against a set of data.

The web application exports a project to a zip file which can directly be executed with JaRE – Java Rule Engine.

The ruleengine JaRE is written in Java and can run either standalone from the command line or may be embedded in other Java related projects. It may be embedded in other tools or web applications.

The main goal of using a business rules and ruleengine approach is to separate the IT logic from the business logic. This way both types of logic can be managed individually and by the relevant domain experts: IT expert or business expert. This creates a proper division of responsibilities, makes IT code cleaner and easier to maintain and thus adds to the overall quality and agility of the system.

By separating IT and business logic, the business user is not confronted with business rules being mixed with complex IT code or work flows. This enhances the transparency for the user.

This document explains the installation, configuration, concepts and usage of the web application.

Prerequisites

To use the web application following prerequisites have to be met:

- Java: The Business Rules maintenance web application is written in Java. It comes in the form of a .war file (web archive).
- Tomcat: Tomcat allows to run Java code on the server side. Any other tool with the same capabilities and allowing to use .war files may also be used.
- MySQL/MariaDB: The web application stores configuration and all data entered by the user in a MySQL database. Other dialects of MySQL such as MariaDB may also

be used.

- A moderately modern web browser. Parts of the application use Javascript to enhance the user experience.

It is assumed that the user – before running the Business Rules Maintenance web application - has a running instance of Java, Tomcat and MySQL already in place.

The web application uses the JaRE Java library (a jar file). In case you want to use/install a newer version of this library see the section "Software Updates".

Installation

1. MySQL/MariaDB: database setup

The first step is to download the schema of the database. The schema contains the definitions of the required database tables and some base configuration data.

Make sure that the MySQL or MariaDB server is actually running. Import the database schema into the running MySQL/MariaDB instance by issuing following command on the command line:

```
mysql -u [user] -p < ruleengine_rules.sql
```

Replace "[user]" in the command with an existing user that has sufficient rights to import the database schema and create the database, tables, indexes and data.

If your MySQL/MariaDB server does not require a username and password then leave out the apprropriate parameters in the command.

2. Apache Tomcat: install the web application

Make sure that Tomcat is actually running. Download the Business Rules Maintenance web application .war file.

Locate where in your system Apache Tomcat is installed. It contains a folder labeled "*webapps*". Copy the .war file into the "*webapps*" folder. Usually Tomcat automatically expands the war file (installs it) and the web application is immediately available. If this is not the case you might have to restart Tomcat.

Open a web browser window and enter following URL (address):

```
http://localhost:[port]/rule_maintenance/
```

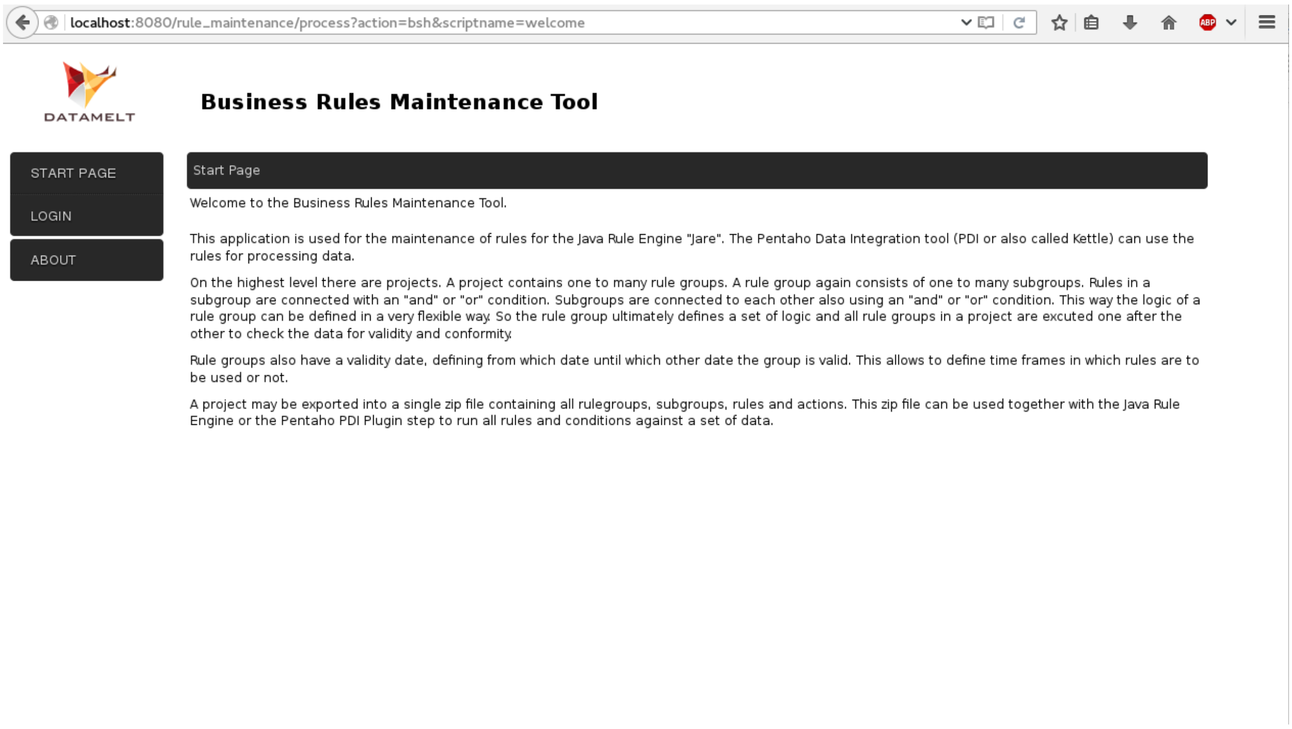
If Tomcat is running on a different server (not localhost), replace "*localhost*" with the server ip address or the hostname for that server. Tomcat usually runs on port 8080. If unsure, check with your Tomcat configuration, which port is used.

You should now see a page of the Business Rule Maintenance web application. On first start-up you may be presented with a configuration page. Enter the details for the database configuration: the host of the MySQL/MariaDB server and the port, the name of the database (the default is: "ruleengine_rules"), the user to access the database and the user password. Finally click on "save" to save the configuration.

Next you will be presented with the login page. If not, click on "Login" in the menu on the left-hand side. Now enter the userid and password for the web application. The default userid is *admin* and the password is also *admin*.

Start Page

Below is a screenshot and overview of the web application Start Page.


localhost:8080/rule_maintenance/process?action=bsh&scriptname=welcome
DATAMELT
START PAGE
LOGIN
ABOUT

Business Rules Maintenance Tool

Start Page

Welcome to the Business Rules Maintenance Tool.

This application is used for the maintenance of rules for the Java Rule Engine "Jare". The Pentaho Data Integration tool (PDI or also called Kettle) can use the rules for processing data.

On the highest level there are projects. A project contains one to many rule groups. A rule group again consists of one to many subgroups. Rules in a subgroup are connected with an "and" or "or" condition. Subgroups are connected to each other also using an "and" or "or" condition. This way the logic of a rule group can be defined in a very flexible way. So the rule group ultimately defines a set of logic and all rule groups in a project are excuted one after the other to check the data for validity and conformity.

Rule groups also have a validity date, defining from which date until which other date the group is valid. This allows to define time frames in which rules are to be used or not.

A project may be exported into a single zip file containing all rulegroups, subgroups, rules and actions. This zip file can be used together with the Java Rule Engine or the Pentaho PDI Plugin step to run all rules and conditions against a set of data.

Screenshot 1: Application Start Page

Menu

The menu is located on the left side of the web application and is always visible. It allows the user to navigate through the application.

The actual menu items displayed will vary depending on if the user is logged in or not and if the user is assigned to the "*Admin*" group – some of the menu items are only available to admin users.

Below is a short description of the individual menu items.

Start Page

The Start Page is the first page a user is directed to after starting the web application or logging into the application. It shows a basic introduction to the purpose of the application.

Password

Allows to change the password of the user. The user has to provide the current password and then twice a new password.

If the application is configured to use LDAP, then a change of the password from within the application is not possible.

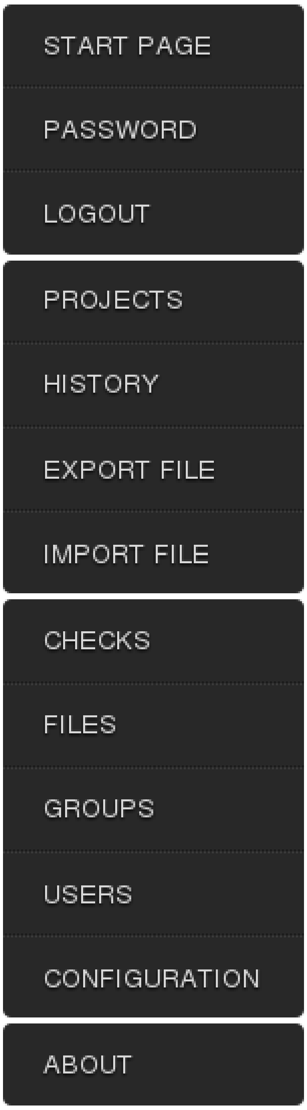
Login/Logout

The web application requires users to enter a userid and password to authenticate. On login it is determined to which group(s) the user is assigned. The user settings steer to which project users have access or which project they see.

Projects

Projects is the central place to work with projects, to create, update or delete rulegroups, subgroups, rules and actions.

Project is the highest hierarchy. A project may contain zero, one or multiple rulegroups. Rulegroups may contain zero, one or multiple subgroups. Rulegroups also may contain zero, one or multiple actions. Subgroups contain zero, one or multiple rules.



Screenshot 2: Application Menu

History

When working with the web application, certain actions of a user are captured. The history allows the user to quickly access these captured actions and so the history acts as a shortcut to allow quicker navigation.

Export File

Allows to export a project. The file created is a regular zip file and contains all rulegroups, subgroups, rules and actions for a given project. The resulting zip file can be used directly with the ruleengine to execute the rules.

Import File

Allows to import a project that previously has been exported. The user has to specify the name and description and the owner group of the imported project.

Checks

Visible only for users in the *Admin* group. Rules use predefined checks to achieve their task. One rule uses exactly one check at a time. By combining rules with different checks a complex logic can be built.

An example for a check is „is equal to", „is greater than" or „is not null". Currently there are 40 different checks available.

Files

Visible only for users in the *Admin* group. The web application uses Beanshell scripts and Apache Velocity templates to separate the programming logic of the web application from its representation on the screen. In the Files section a user with administrative rights can change the web application code or display on the fly.

Groups

Visible only for users in the *Admin* group. Groups define a collection of users that have the same access rights to projects. Different groups can contain different users and these can access different projects.

Users

Visible only for users in the *Admin* group. A user can be assigned to one or multiple groups.

Configuration

Visible only for users in the *Admin* group. The configuration defines the details of the connection of the web application to the database and optional LDAP settings.

About

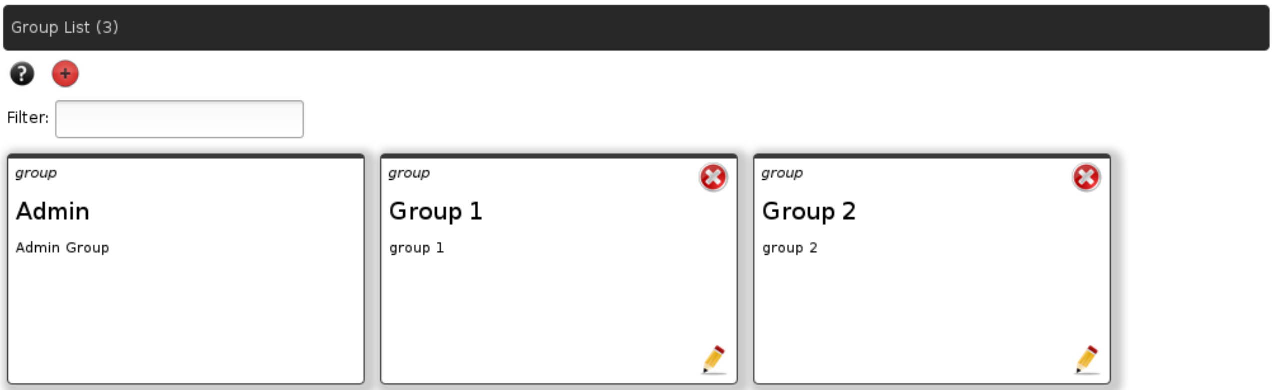
The about page shows information about the web application version and other details.

Concepts

This section explains the concepts that build the base for this web application. It is also related to the concept of the ruleengine that is used when the rules are executed against a set of data.

Group Management

The web application allows to define and modify groups. Users can be assigned to one or more groups. The settings for a project allow the definition to which group the project belongs. All users that are assigned to this group may read and update all details of the project, rulegroups, subgroups, rules and actions. Users not being part of the group have a read-only access to all the mentioned parts. The group *Admin* can not be updated or deleted, as it is required by the system. Users that are assigned to this group have admin privileges for the web application.



Screenshot 3: List of groups

User Management

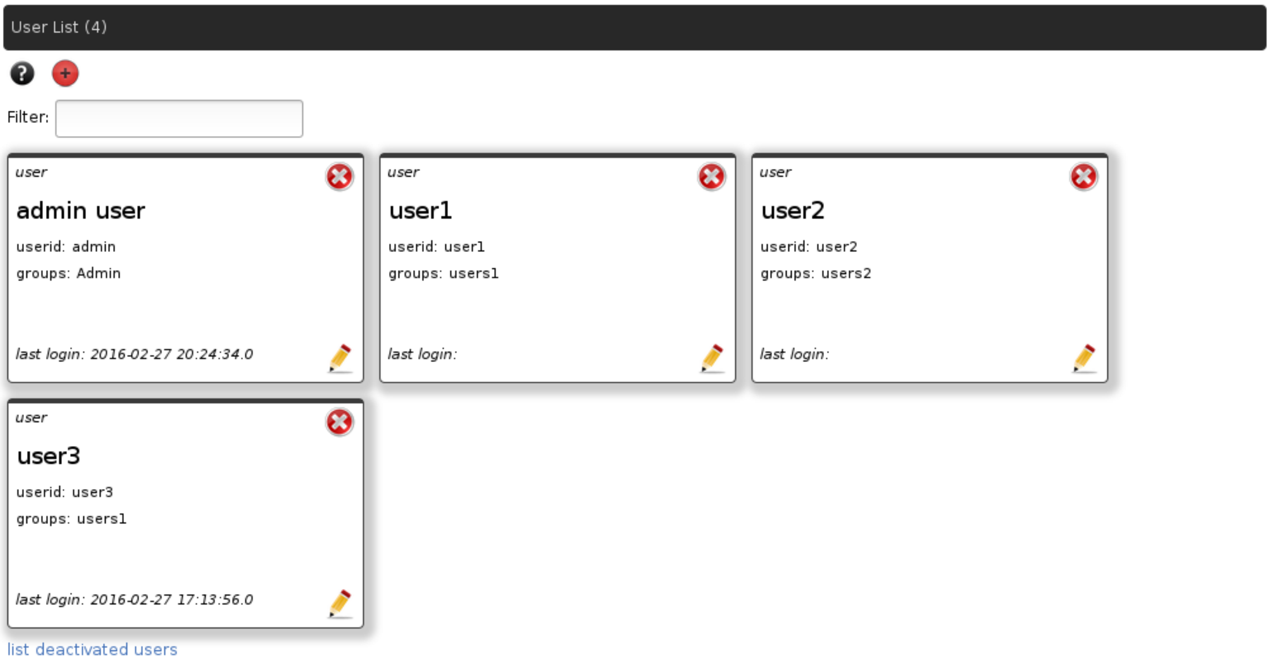
The web application allows to define and update users. Users can be assigned to one or multiple groups. See „*Group Management*“ for more details.

Each user that is added will have access to the web application and the groups that are assigned to her/him.

Users may be deactivated. A deactivated user can not login to the web application anymore but all relevant data of the user such as history are conserved. When the user is finally deleted, all user data is deleted too.

Currently the users password is displayed when the user is created (and never again). In a future release this will be changed to a more sophisticated approach.

In the configuration dialog a user with administrative privileges may configure the settings of a LDAP host. On successful setup, users will be authenticated against LDAP. Therefore the userid in this web application and the if of the user in LDAP have to be the same.



user
admin user
userid: admin
groups: Admin
last login: 2016-02-27 20:24:34.0

user
user1
userid: user1
groups: users1
last login:

user
user2
userid: user2
groups: users2
last login:

user
user3
userid: user3
groups: users1
last login: 2016-02-27 17:13:56.0

Screenshot 4: List of users

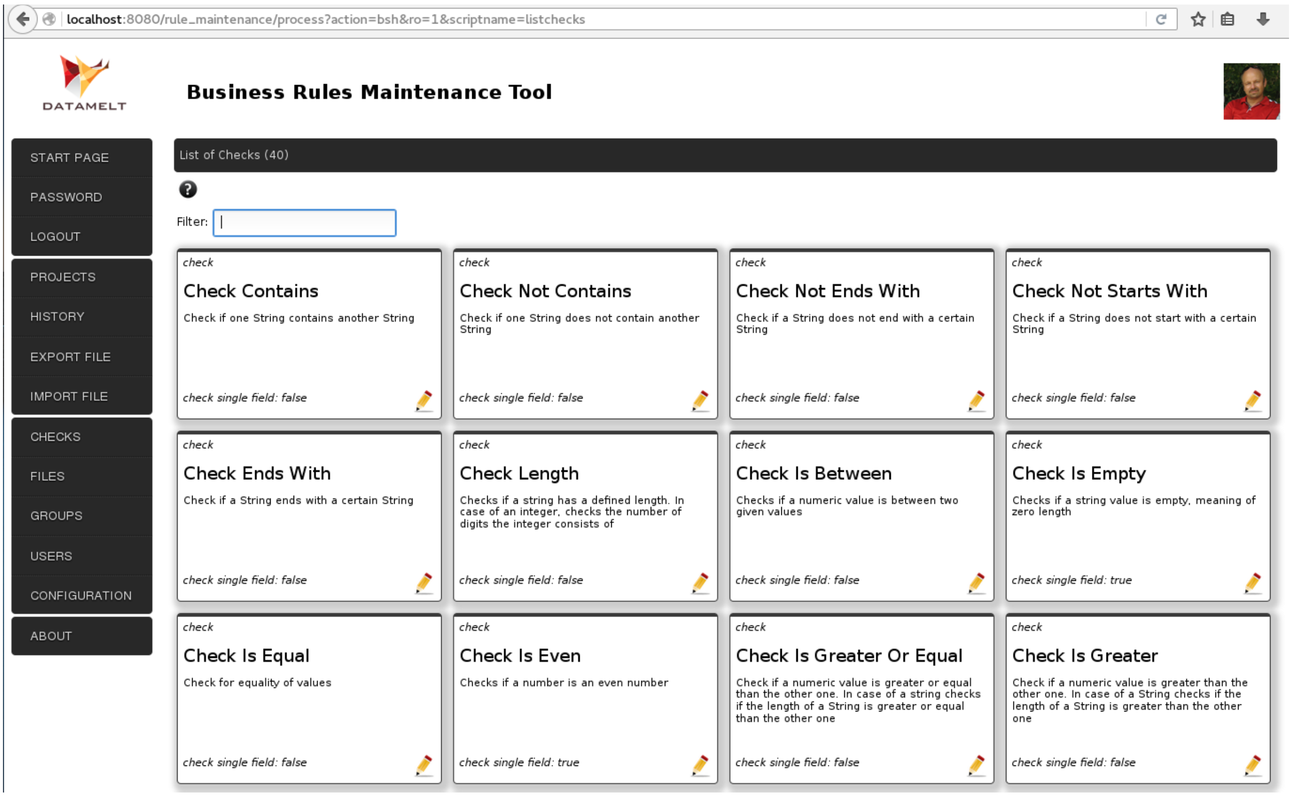
Project Management

Projects are containers for rulegroups, subgroups, rules and actions. They group all parts together. When a project is created it has to be assigned to a group. Users assigned to this group have read and write access to all parts of the project. Other users have read-only access to all parts of the project.

If a project is marked as private project, only users assigned to the owner group the project belongs to have access to the project. Other users don't see the project.

Checks

A check is an individual module that is designed to fulfill one specific test. For example one check “is equal to”. It tests, if the given data is equal to the expected result. There are currently 40 checks available. They are referenced by the rules and by the combination of several checks a complex logic can be built to test for certain conditions of the data.



Business Rules Maintenance Tool

List of Checks (40)

Filter:

check
Check Contains
Check if one String contains another String
check single field: false

check
Check Not Contains
Check if one String does not contain another String
check single field: false

check
Check Not Ends With
Check if a String does not end with a certain String
check single field: false

check
Check Not Starts With
Check if a String does not start with a certain String
check single field: false

check
Check Ends With
Check if a String ends with a certain String
check single field: false

check
Check Length
Checks if a string has a defined length. In case of an integer, checks the number of digits the integer consists of
check single field: false

check
Check Is Between
Checks if a numeric value is between two given values
check single field: false

check
Check Is Empty
Checks if a string value is empty, meaning of zero length
check single field: true

check
Check Is Equal
Check for equality of values
check single field: false

check
Check Is Even
Checks if a number is an even number
check single field: true

check
Check Is Greater Or Equal
Check if a numeric value is greater or equal than the other one. In case of a string checks if the length of a String is greater or equal than the other one
check single field: false

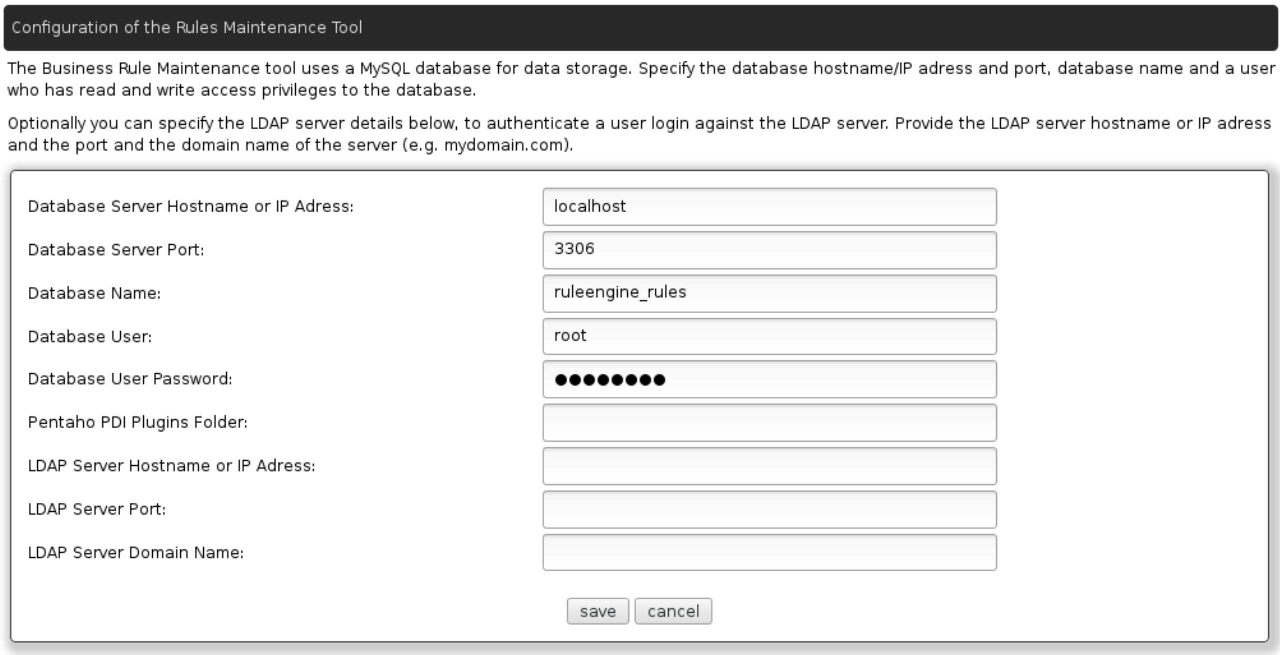
check
Check Is Greater
Check if a numeric value is greater than the other one. In case of a String checks if the length of a String is greater than the other one
check single field: false

Screenshot 5: List of checks

The ruleengine can be extended by other checks. Please read the appropriate documentation on how to create your own checks.

Configuration

The configuration page allows to define the basic settings for the application. An administrator may update the settings for accessing the database and the LDAP settings.



Configuration of the Rules Maintenance Tool

The Business Rule Maintenance tool uses a MySQL database for data storage. Specify the database hostname/IP adress and port, database name and a user who has read and write access privileges to the database.

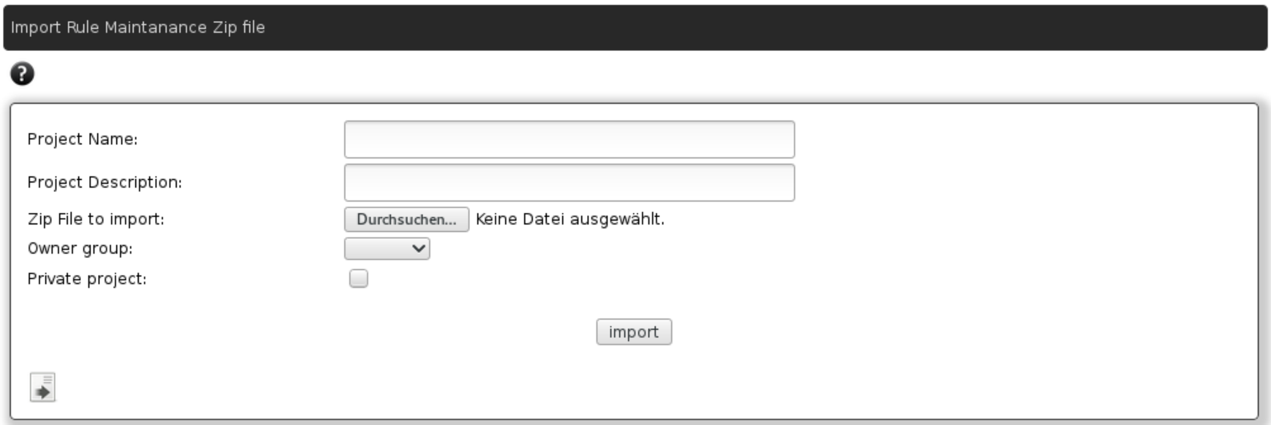
Optionally you can specify the LDAP server details below, to authenticate a user login against the LDAP server. Provide the LDAP server hostname or IP adress and the port and the domain name of the server (e.g. mydomain.com).

Database Server Hostname or IP Adress:	localhost
Database Server Port:	3306
Database Name:	ruleengine_rules
Database User:	root
Database User Password:	●●●●●●●●
Pentaho PDI Plugins Folder:	
LDAP Server Hostname or IP Adress:	
LDAP Server Port:	
LDAP Server Domain Name:	

Screenshot 6: Configuration

Import Project

A project – in the form of a zip file - that has previously been exported using this web application can be imported. This allows the exchange of project files and definitions between different users or across different companies.



Import Rule Maintanance Zip file

Project Name:	
Project Description:	
Zip File to import:	Durchsuchen... Keine Datei ausgewählt.
Owner group:	
Private project:	□

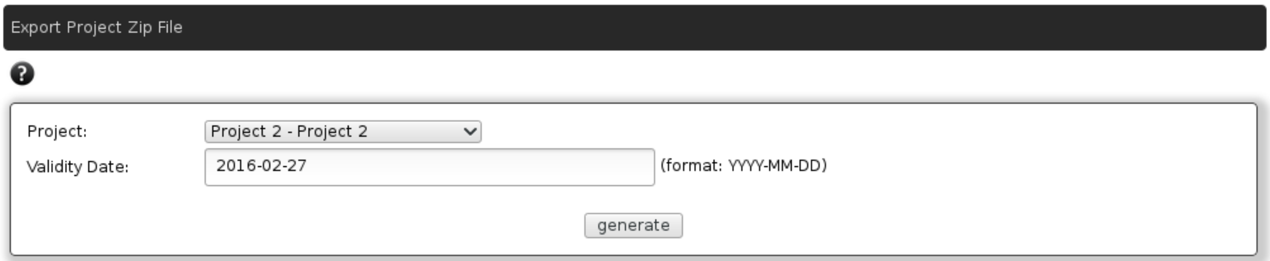
Screenshot 7: Import project

If a project is exported to a file, it can be safely deleted and then re-created by importing the project file. There is no data loss in this process.

Export Project

A project may be exported. In the process a zip file is created that can directly (without modifications) be run with the JaRE ruleengine.

When exporting, the user has to select the project and enter a validity date for which he/she wants to do the export. The validity date steers which rulegroups are exported. Rulegroups have a start and end validy. Only those rulegroups are exported which a valid for the specified validity export date.



Export Project Zip File

Project: Project 2 - Project 2

Validity Date: 2016-02-27 (format: YYYY-MM-DD)

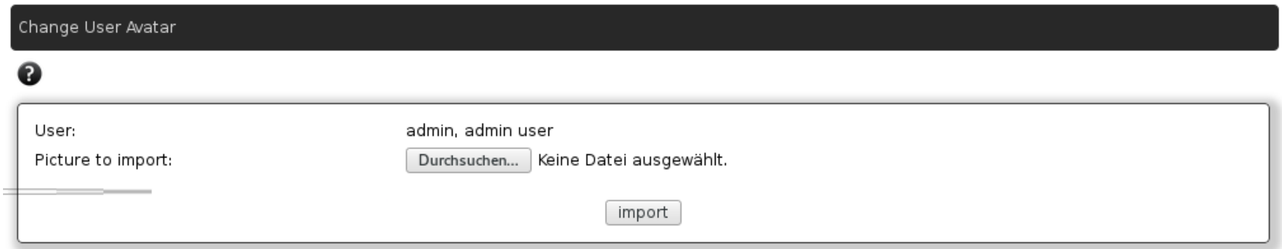
Screenshot 8: Export project

History

Projects can contain a certain number of rulegroups, subgroups, rules and actions. This makes it time consuming to locate a certain component. The History lists components that lately have been looked at or updated by the user that is logged in. The user won't see the history of the other users.

User Avatar

The user may choose a picture for his/her representation. It is shown on the upper right-hand side of the web application. Clicking on the picture – or the default picture if undefined – will allow the user to upload a picture to be used as the users avatar.



Change User Avatar

User: admin, admin user

Picture to import: Keine Datei ausgewählt.

Screenshot 9: Change User avatar

Help

In various places/screens of the web application, there is help available identified by a little icon with a question mark inside:

?

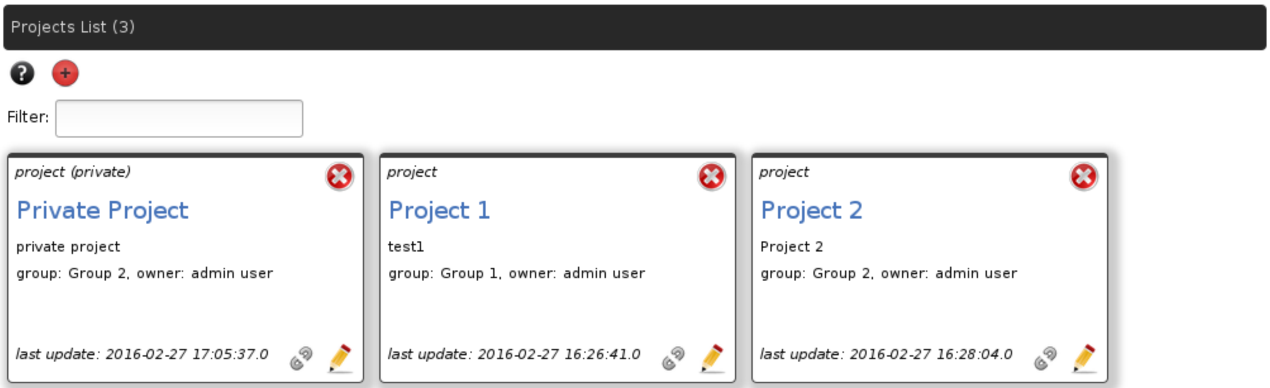
Click on the icon to display a short help text. Click on it again to hide the help text.

Projects

Project is the highest hierarchy. A project may contain zero, one or multiple rulegroups. Rulegroups may contain zero, one or multiple subgroups. Rulegroups also may contain zero, one or multiple actions. Subgroups contain zero, one or multiple rules.

Project belong to exactly one owner group. All members of this group can read, add, update and delete all content of the project. If the project is marked as being “private“, users that are not members of the owner group can not see the project.

If you are a user of Pentaho PDI then you can attach a ETL transformation to a project. The advantage is, that instead of typing in fieldnames and types, you will get a list of fields for selection, which the web application extracts directly from the ETL transformation.



Projects List (3)

Filter:

project (private)
Private Project
private project
group: Group 2, owner: admin user
last update: 2016-02-27 17:05:37.0

project
Project 1
test1
group: Group 1, owner: admin user
last update: 2016-02-27 16:26:41.0

project
Project 2
Project 2
group: Group 2, owner: admin user
last update: 2016-02-27 16:28:04.0

Screenshot 10: List of projects

Rulegroups

Rulegroups are the containers for subgroups, rules and actions. They have a validity start and end date defined. It defines in which timeframe a certain rulegroup and all its content is valid. This allows to define a logic that is automatically valid at a certain date - so you can plan ahead - and later on automatically expires and is not used anymore.

Subgroups

Subgroups are the containers for rules. Within one subgroup all rules are connected using the same condition: either "and" or "or" - you can not use a mixture. Subgroups are connected to each other (to the previous subgroup) also either by "and" or "or". The combination of "and" or "or" in the subgroup plus the combination of "and" or "or" between the subgroups gives the user the flexibility to define any complex logic.

Rules

The rules are the working horse of the ruleengine. On exection data is passed to the rule, the rule is executed and the result is a "passed" or "failed" state. All rules in a rulegroup form a certain logic.

Actions

Actions belong to the rulegroup they are defined in. When a rulegroup – and all its rules – is executed, the result is either a "passed" or "failed" state. An action can run based on this state and execute e.g. an update to the data, do calculations and modify the data, send messages, log information and more.

A rulegroup may have zero, one or many actions. The actions are executed one after the other.

Pentaho PDI

The web application produces/exports a project and all relevant settings and data to a single zip file. This file can be used with the JaRE ruleengine. Note that it is **not** required to use any Pentaho software to do so – the ruleengine can run standalone from the command line or integrated into any Java application.

But there is a certain integration of the ruleengine with the ETL tool from Pentaho which is called *Pentaho PDI* or also *Pentaho Kettle* (previous/old name). There are plugins available for *Pentaho PDI* which make it very easy to use and interact with the ruleengine. This helps the ETL developer and designer to seperate his code from business rules and allows for cleaner design and code.

The ruleengine plugins for Pentaho PDI are available through the Pentaho marketplace. They can easily be installed through the interface of the ETL tool.

Workflow

To be written....

Software Updates

The Business Rules Maintenance web application uses several software libraries. If a newer version of these libraries is available it might be possible to replace the existing ones. This depends on the compatibility of the newer libraries with this web application code.

The libraries are located in following folder:

[Tomcat root folder]/webapps/rule_maintenance/WEB-INF/lib

Updates to the base components of Java, Apache Tomcat and MySQL/MariaDB should in general be possible without interference to the web application.

Extending the Ruleengine

The ruleengine can be extended for the two main concepts: checks and actions. By implementing a defined interface the developer can create new checks or actions. The resulting Java classes can then be added to the ruleengine jar file or to the Java classpath, so they can be located.

Contact

For questions or feedback please contact me.

- Email: uwe.geercken@web.de
- Twitter: @uweeegeee

Links

Below is a list of links to software or web pages references in this document.

- MySQL/MariaDB database schema:

  Link: https://github.com/uwegeercken/rule_maintenance_db

  Download file: ruleengine_rules.sql

- Business Rules Maintenance web application .war file

  Link: https://github.com/uwegeercken/rule_maintenance_war

  Download file: rule_maintenance.war

- Apache Velocity Template engine

  Link: http://velocity.apache.org/

- MySQL Database Server and tools

  Link: http://www.mysql.com/

- MariaDB Database Server and tools

  Link: http://mariadb.org/

- Oracle Java

  Link: https://www.java.com

Defaults

Listed below are defaults that the web application uses.

- Business Rules Maintenance application default login

  userid: *admin*

  password: *admin*

- Database name: *ruleengine_rules*

Subject Index