Team Walrus

Drools Rules Engine

IMPLEMENTATION PLAN

Version 1.0
12/16/16

VERSION HISTORY

This is the initial version of the implementation plan. The document was designed, and then entered into our document management system until approved and released to the Owning sOrganization.

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	Damen Tomassi	1.0	DC	12/16/16	Initial Creation

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1. Introduction

1.1 Purpose

The purpose of this plan is to provide a general overview of the general implementation of the project that will be known here and after as the “Drools Rules Engine” or as simply the “DRE”.

1.2 System Overview

The DRE is implemented in such a fashion that a non-technical user, with little to no experience with the underlying rules engine can create, implement, fire, and generally utilize a rules based decision engine.

The DRE is currently broken down into 3 main components, each comprised of several sub-components. The main components are the “driver”, “parser”, and “ruleContainer”. Each of these components contains critical components that are necessary for the program to function properly.
driver - contains components that are necessary to interact with the program and utilize all of its functionality.
parser - contains components that are necessary for the program to function properly on the “back end” that the end user is not exposed to
ruleContainer - contains components that are necessary for the end user to create new rules, as well as for created rules to properly function with in the DRE system.

1.2.1 System Description

The system has been designed in a generic fashion, such that it can be utilized in a wide variety of situations. The DRE is designed such that rules can be developed and implemented (by a non technical individual) in such a fashion that they can fit nearly any scenario. If data is being generated, the system can be adapted to read this data and perform actions upon the results of the data. Multiple data sets can be entered into the system, and rules can be created that utilize and capitalize upon multiple sources of data. Rules can even be “chained” together to perform more complex actions.

An example of how the system could be implemented is in a production facility - if log files are generated that record average temperature deviation of a specific component during production, a rule can be written to notify the operator when the tolerance has been exceeded.

1.2.2 Assumptions and Constraints

This document can be read and understood with minimal knowledge of the underlying structure of the Rules Engine or the DRE. While prior experience may be helpful for understanding some concepts, it is not necessary. It is assumed the reader of this document has a general understanding of most programming concepts. Due to the obvious nature of the college atmosphere, and the basis of this project – there were numerous constraints placed on to the development team:

- Schedule - The project was to be completed with in one Semester.
- Budget - $0, however labor costs are negated as work was performed on a volunteer basis.

- Resource availability and skill sets - External supported was limited to freely available resources on the internet. Developers came from similar backgrounds so had similar skill sets which may have constrained the project.
- Software - due to budget constrictions the Rules Engines inspected for suitable use were only freely available, open source Rules Engines.

1.2.3 System Organization

The DRE ideally is utilized to bridge a gap between multiple systems that are currently in place. As such it was implemented and designed in such a fashion to be an extremely generic program. The software product is to be installed on a machine that generates the appropriate log files that contain the facts that decisions are to be based off of. This machine should also have access to any additional system that rules may affect. While the underlying structure of the system is complex, featuring an entire rules-based decision engine, the software package completely installs by simply installing the one executable file that our entire program is contained within.

The foundation of the entire DRE is the Drools Rules Based Decision Engine. While this program is difficult to install due to reasons compounded by its open source nature, it is not necessary for the end-user to install the program, as necessary component installation is handled by the DRE. While hardware can vary amongst installations, it is recommended that the DRE is installed on a modern and fast computer to achieve peak performance results.

The three main components of the DRE are the “driver”, “parser”, and “ruleContainer”. The driver component is comprised of 2 subcomponents - “driver” and “prototype”. The subcomponent “driver”’s main functionality is to provide the interface for the user to communicate with the DRE program. The “prototype” is responsible for instantiating the Drools Decision Engine also known as the KieSystem.

Parser is composed of four subcomponents - “ActionObject”, “DataObject”, “DataObjectCollection” and “Parser”. It is easiest to understand by first beginning with what a DataObject is. A DataObject is an object that is created to handle “raw” data that is read in from a data log. It is how the DRE Normalizes data. These are collected in a DataObjectCollection. ActionObjects are dynamic data objects, that is they are DataObjects that can be defined at runtime. The parsers function is to create DataObjects from the log file.

The RuleContainer component is also composed of four subcomponents - “KieManager”, “RuleCreator”, “RuleManager”, and “RuleTextEditor”. The KieManager component serves the very important function of actually “containing” the active rules in the session - this means this component is responsible for “firing” the necessary rules at the necessary time, it is the key component. RuleCreator allows for a non technical user to quickly and easily create a complex rule, while RuleManager simply manages the rules performing tasks such as switching rules on or off at the users request. The RuleTextEditor component is a function for advanced users, it allows users that are comfortable with manually building and editing rules, without the assistance of the rule builder, to manually alter a specific rule.

1.3 Glossary

DRE - Drools Rule Engine.
Drools - A freely available, open source rules based decision engine.
KieSystem - The functioning portion of the Drools Rules Based Decision Engine.
JVM - Java Virtual Machine

2 Management Overview

When the program is inspected, and deemed fit for implementation - the owner of the application will have to determine which rules the organization would like to implement within the DRE. Once these rules are determined, the owning organization will have to inspect available data logs that are being generated by outside programs, and determine which parameters should be included in the DRE rule to trigger a rule to "fire" and execute some action. After this determination has been made, the organization will have to implement the necessary rules, utilizing the tools included in the DRE - such as the rule building application.

To appropriately build the rules, the only organization will have to import some data logs for the program to use to understand the formatting and available data fields of the data logs that are being generated. After all of the rules are constructed, the only organization is responsible for ensuring that the DRE system remains up, and all necessary rules are switched on at all times the owning organization wishes rules to be fired after the necessary conditions are met.

2.1 Description of Implementation

The system is to be deployed in a phased fashion with rules entering service as they are entered into the system. As soon as the system is installed, it is ready to begin excepting new log files and this new rules. As rules are required to be implemented one by one, it may take a significant amount of time to enter a large number of rules – for this reason it is recommended that the system be activated as soon as a minimum number of rolls are entered, such that the owning organization can begin receiving immediate benefits from the system without having to wait for the entirety of their rules to be entered into the system.

2.2 Points-of-Contact

Role	Name	Contact E-Mail
Business Sponsor	Kevin Wainwright	kevin.weinwright@asrcfederal.com
Project/Program Manager	Bryan Nunez	nunezb5@students.rowan.edu

System Developer or System Maintainer	David Carlin	carlind0@students.rowan.edu
Quality Assurance Manager	Nick Faccenda	faccendan5@students.rowan.edu
Configuration Management Manager	Jacob Kershaw	kersha02@students.rowan.edu
Security Officer	Clifford Black	blackc6@students.rowan.edu
System Developer	Damen Tomassi	tomassid0@students.rowan.edu

Table 2.2 – Points-of-Contact

2.3 Major Tasks

Implementing the DRE system can be accomplished in four easy steps, which are outlined below. The key tasks include installing the system, importing log files, building rules, and firing said rules. It is crucial that each task is carried out in the appropriate order such that the DRE system will function properly.

2.3.1 Install DRE System

Installation of the DRE system is very simple, it should take less than 1 hour for each machine! Detailed instructions are available in the User Guide. This is the first step, and the most crucial step to utilizing the DRE system.

2.3.2 Import Log Files

Log files are necessary for the system to be able to create appropriate rules, as well as to act on the rules it creates. Log files should be in CSV format and imported into the program by following the on-screen instructions.

2.3.3 Build Rules in System

Rules can be built in two ways - by utilizing the DRE system rule builder, or by manually typing each rule. It is recommended that novice users utilize the rule builder as it handles all difficult aspects of creating a rule. Expert users may decide to manually type each rule in a text editor - one is supplied with the DRE system, however any text editor will work . Rolls should comply with the Owning Organizations goals for the DRE system.

2.3.4 Fire Rules

After all of the rules have been added into the system, the rules can be fired from the logs in one of two ways - a single line at a time, or throughout the entire log file all at once. As new log files become available - it is important to import them such that the program is always using the most up-to-date data.

2.4 Roll-Out Schedule

Roll-Out Schedule is entirely up to the Owning Organization, however there is a recommended sequence that should be followed to ensure the timely implementation, and roll out, of the DRE system. The recommended sequence is below, while many tasks are time dependent upon the specific implementation at each site, and estimation for a typical installation is described in the following documentation:

Task	Estimated Time (per machine)	Additional Information
Install DRE System	< 1 Hour	Instillation depends on host machine speed, but can typically be completed in as little as 1 minute.
Load Log Files into DRE System	~ 1 Hour	This step depends on the number of log files to be imported into the system, if the log files are readily available and there is less then approximately 10,000 installation will take place in a matter of minutes.
Create Rules	<1 hour - Several Weeks	The number of rules to be implemented greatly affects the time it will take to create the rules. A single rule can be created in approximately 1-2 minutes, assuming the user has a preconceived idea of what the rule should perform, and what will trigger the rule.
Utilize DRE	-	The System is set up and ready to be utilized at this point!

2.5 Security and Privacy

The system does not make separate considerations for keeping data secure, any data passed into the program must be in an unencrypted CSV format. As security was not described as a requirement in the system requirements, no considerations for this were made. The system is as secure as the host computer is, as the system does not make any attempts to connect to the Internet.

2.5.1 System Security Features

The system does not implement or make use of any proprietary security features. It is recommended that the host computer has a strong password to prevent unauthorized interference, as well as the host computer being placed on a "air gap" from the Internet if the DRE will be used for any secure or mission critical operations.

2.5.2 Security Set Up During Implementation

Since the system does not provide any proprietary or secure information, as all of that information is provided at the installation site by the Owning Organization, it is not necessary for any security precautions before the DRE is installed.

3 Implementation Support

The DRE system has been designed in such a fashion that it can be implemented on nearly any kind of system that is already in place. The DRE system does not require any special hardware, however there are software requirements – namely that other programs on the computer, or in the system, are capable of outputting their data to a CSV style data log.

3.1 Hardware, Software, Facilities, and Materials

The DRE system is intelligently designed to integrate with the system that you already own – no additional hardware, facilities or materials are required to fully implement and take advantage of the DRE system. The only requirement is that, to integrate with other pieces of software, the other pieces of software must generate data log files in a CSV format.

3.1.1 Hardware

No specific hardware is required to run the DRE system, it can be fully integrated with a system that is already in place – a desktop or laptop computer is powerful enough to run the DRE system.

3.1.2 Software

The DRE system is intelligently designed to run on the Java virtual machine - any system that is capable of running the JVM – is capable of running the DRE system. It is recommended to use a windows, or Macintosh computer. The DRE system must be installed on the computer, before the Owning Organization can take advantage of its properties.

3.1.3 Facilities

No facilities are required to utilize the DRE system. The DRE system is intelligently designed so that it can be easily installed within minutes by untrained staff – then when running the program helpful steps display that assist the staff with utilizing the program – with virtually no training.

3.1.4 Materials

No additional materials are required to support the system - at run time or during installation.

3.2 Documentation

Extensive documentation is included with the DRE system. The documentation will be delivered to you along with the DRE system. The following documentation will be delivered:
User Manual
Design Document
Validation Document
Test Plan and Procedure
Implementation Plan (this document)

3.3 Personnel

After initial installation of the DRE system – no staff is required for the daily operation of the system. However as the system makes decisions, staff may be required to act upon the decisions being generated. However, staffing requirements for this are not software specific and vary greatly depending on the specific rules that have been implemented - so staff required to act upon these rules will not be counted in this section.

Rule creation can be a laborious process, it can be accomplished by one individual or several simultaneously on multiple machines – it is recommended to dedicate one staff "hour" per 20 rules for initial rule creation.

3.3.1 Staffing Requirements

After initial installation, Staffing is at the stole discretion of the Owning Organization. During the initial installation phase, where rules will be created, it is recommended to dedicate one staff "hour" per 20 rules that are to be created. The Owning Organization can adjust the staff to accomplish the initial creation in a time that is acceptable to the organization. For example if 100 rules are to be created – it would take approximately five staff "hours" to accomplish this goal. The five staff hours can be divided amongst five team members so that it would only take one real hour to accomplish, or one team member could create all of the rules in approximately five hours.

3.3.2 Training of Implementation Staff

No training is required to implement the DRE system, the only thing that is required is to install the DRE system as any other program would be installed on the machine.

3.4 Outstanding Issues

At this time there are currently no known issues with the version of the software that will be implemented.

3.5 Implementation Impact

The DRE system is intelligent design such that implementation should not have a significant impact on the daily office activity flow. There is not expected to be a significant increase in support activity with the

product as it is not likely to be beyond the scope of a typical user to understand. The system may have an initially negligible impact on system storage, that could grow depending on how many rules are implemented. As rules are essentially saved as text, it would take many thousands of rules to have a noticeable impact on system memory.

3.6 Performance Monitoring

The DRE system should be operating continuously – that is at all times day and night. The Owning Organization should ensure that the host computer is operational and functional at all times. The organization should also periodically inspect the DRE System to ensure that it has not encountered an error – if it has the owning organization should immediately restart the DRE system.

3.7 Configuration Management Interface

As per the original terms of work, only one version of the DRE system will be presented to the Owning Organization. The version of the DRE system that is included with this documentation is the only version the Owning Organization will receive under current contract terms.

4.0 Change Management

The DRE system is intelligently designed to not interrupt the normal workflow of the typical office environment. The DRE system can go in to effect silently in the background and users can utilize the decisions generated by the system to assist in their own analysis of a particular situation.

4.1 User Training

The DRE system was intelligently designed to minimize the need for user training. The system includes a user manual which we recommend is read by all potential users, aside from this - there is virtually no training required as the system makes use of easy to use wizard for the most complex part of utilizing the program - which is constructing a rule.

4.2 Communication Plan

During the development of the system regular sprint reviews or scheduled every two weeks to review the development teams progress on the system being developed.
There will be no further scheduled communication between the developers and the owning organization after the DRE has been delivered. Should the Owning Organization need to contact the development team for any reason after the DRE has been delivered, they can do so at the email addresses included in section 2.2 “Points of Contact” of this document.

4.3 Acceptance Criteria

The acceptance criteria can best be defined by accomplishing the original goals laid out in the initial contact document from the Owning Organization to the development team. For simplicity the goals have been listed below, along with a short description indicating how we have met the goal.:

1. Provide a whitepaper design document and prototype of the Rules Framework in action executing on multiple different decision points concurrently - The white paper design document will be provided with the DRE system at delivery time.
2. Demonstrate branched decisions within a framework instance - demonstrated during sprint reviews, this action is also able to be confirmed utilizing the DRE system by the Owning Organization.
3. Demonstrate how two instances can be coupled/chained together - demonstrated during numerous sprint reviews, this action is also able to be confirmed utilizing the DRE system by the Owning Organization.
4. Document the performance and scaling attributes of the Rules Engine against varying degrees of decision complexity and/or number of data sources - Theses tests were performed and documented. Documentation will be provided with the DRE system to the Owning Organization.
5. Develop a simple UI to allow one to manage, configure and activate/deactivate a Rules framework instance - demonstrated during sprint reviews, this action is also able to be confirmed utilizing the DRE system by the Owning Organization.

APPENDIX A: Project Implementation Plan Approval

The undersigned acknowledge that they have reviewed the Drools Rules Engine Implementation Plan and agree with the information presented within this document. Changes to this Project Implementation Plan will be coordinated with, and approved by, the undersigned, or their designated representatives.

Signature: _____ Date: _____

Print Name: _____

_____

Title: _____

Role: Project Manager

APPENDIX B: REFERENCES

The following table summarizes the documents referenced in this document.

Document Name	Description	Location
User Manual	Document describing typical use of the system.	Provided with DRE System
Design Document	Document describing design of the system.	Provided with DRE System
Validation Document	Document describing how the system is validated for use.	Provided with DRE System
Test Plan and Procedure	Document describing how the system was tested to ensure compliance.	Provided with DRE System

APPENDIX C: KEY TERMS

The following table provides definitions and explanations for terms and acronyms relevant to the content presented within this document.

Term	Definition
DRE	Drools Rule Engine
Drools	A freely available, open source rules based decision engine
KieSystem	The functioning portion of the Drools Rules Based Decision Engine
JVM	Java Virtual Machine

APPENDIX D: System Hardware Inventory

No hardware is provided with the DRE system.

APPENDIX E: System Software Inventory

Name/ ID	Type	Model/ Version	Physical Location	Equipment Owner (Person or Dept)	Maintenance Contract ? Y/N	Maintenance Contact Point	Maintenance Type/ Level of Coverage	Maintenance Period Expiration Date	Required Licenses
DRE System	System	1.0	N/A	Owning Organization	N	Bryan Nunez	N/A	N/A	N/A