

Driving Dynamic Questionnaires using JBoss BRMS An Insurance Use Case

July 2015



Agenda

- Introductions
- Why use a Business Rules Management System (BRMS)?
- When should you use a BRMS?
- Insurance Business Use Case
- Dynamic Questionnaire Design
- Demonstration
- Summary
- Questions and Answers

Introductions

Joe Dickman – SVP, Vizuri

Business leader working with organizations to understand how to leverage innovation for increased business agility. Specializes in insurance, financial service, retail, and logistics.



Ken Spokas – Technical Director, Vizuri

Technology and Subject Matter Expert working with organizations to evaluate architectural approaches, design extensible solutions, and introduce innovative technologies to improve business agility.



Vizuri Overview

- Expert Java EE & Open Source Solution Provider
- Premier Red Hat Business Partner
- Premier JBoss Business Partner
- 4 Red Hat Innovation Awards
- 5 Time JBoss Middleware Partner of the Year
- Certified Resources
- Sponsor DC JBoss Users Group
 - Largest JBoss User Group World-Wide



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Vizuri Core Strength

Bridging Business and Tech

- ◆ Identify strategic business drivers
- ◆ Understand customer's business
- ◆ Evaluate architectural alternatives
- ◆ Design solutions using proven, innovative, and adaptable technologies
- ◆ Validate designs through iterative prototyping

Business Strategy

Solution Architecture

Development Implementation

Building Extensible Solutions

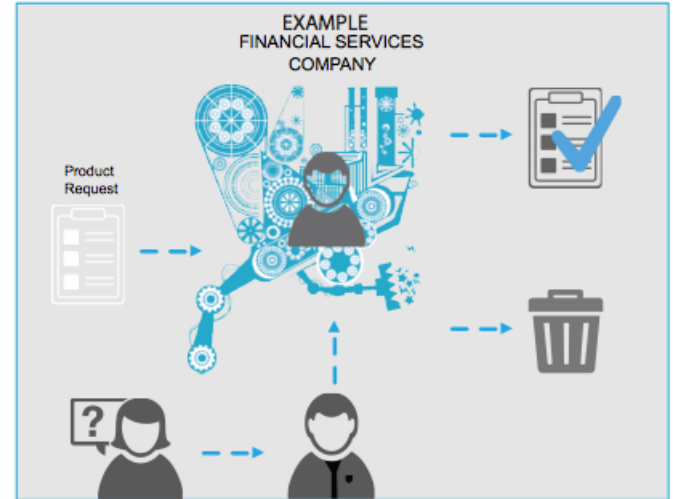
- ◆ Reference Architecture
- ◆ Continuous Delivery
- ◆ Design Patterns
- ◆ Performance
- ◆ Scalability
- ◆ Resiliency

Why use a business rule management system?

A business rule management system (BRMS) enables organizational policies, and the operational decisions associated with those policies, to be defined, deployed, monitored and maintained separately from core application code.

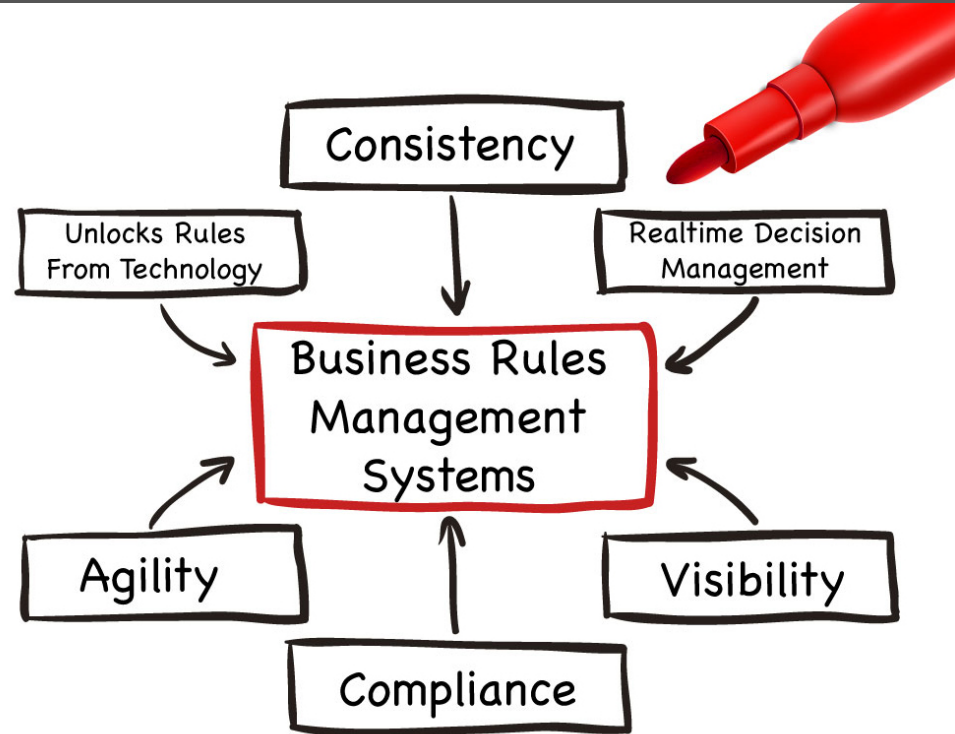
Problems:

- Business Rules are hidden in applications
- It takes too long to change business rules
- People interpret rules inconsistently



BRMS Benefits

- **Unlock** the business rules from the underlying technology
- Express rules in terms that the business analysts can readily understand – **visibility**
- Empower business and IT experts to collaborate – **agility**
- Support **compliance** by applying rules to facts – **consistency**



When should you use a Rules Engine?

Complex problems...

- Highly conditional
- Logic prone to change
- High-level of subject matter expertise required
- Goal is new, still being defined

Traditional code approach not working well

- Problem is too fragile to approach procedurally
- Analyst needs insight into implementation



Related Business Case Examples

Compliance, Audit, and Policy Related Business Processes

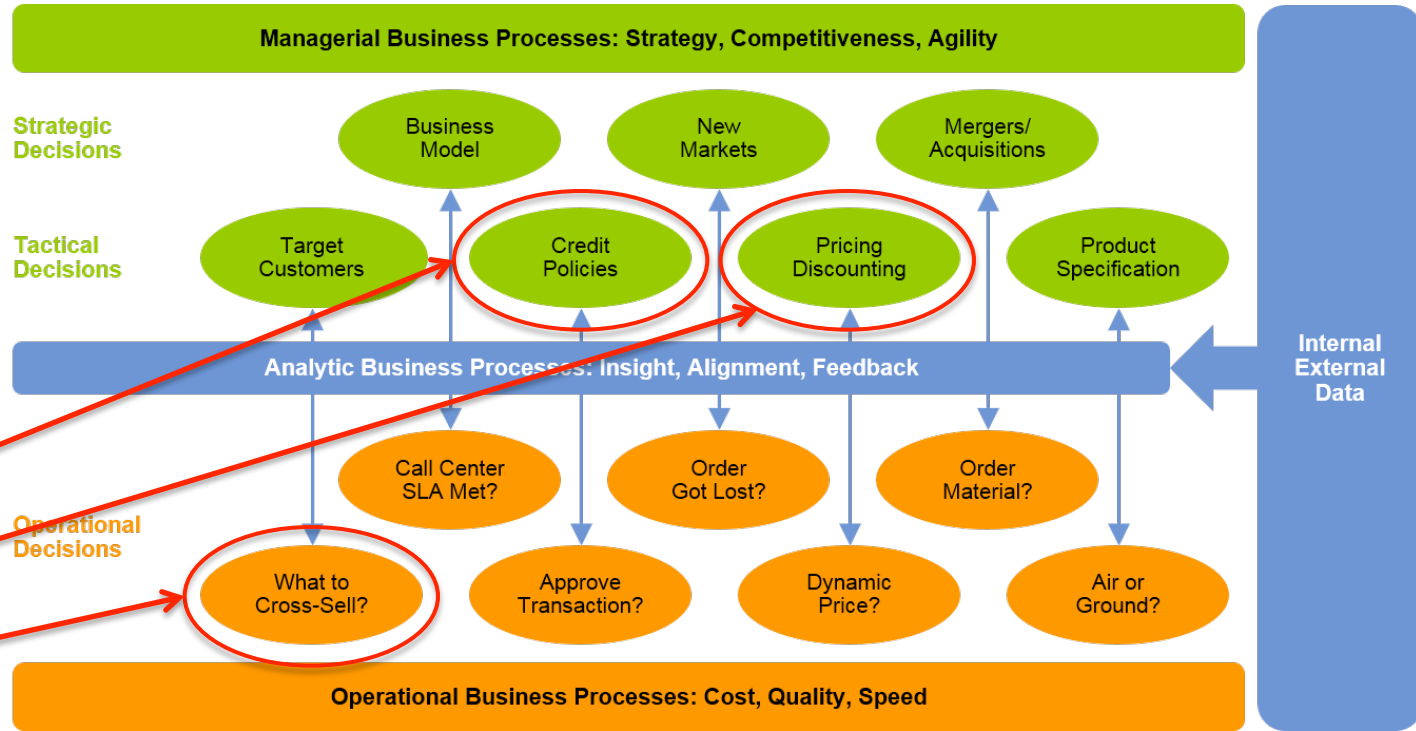
- Insurance Underwriting
- Health Insurance Eligibility
- HIPAA
- SEC Finance Disclosure
- Mortgage Lending
- Government Agencies



Improving the business decision-cycle

BRMS aligns organizational policies with operational decisions consistently

- How much credit to extend?
- Do they qualify for a price discount?
- What other products should I cross-sell?



Business Rules Management System

Dynamic Questionnaire Builder

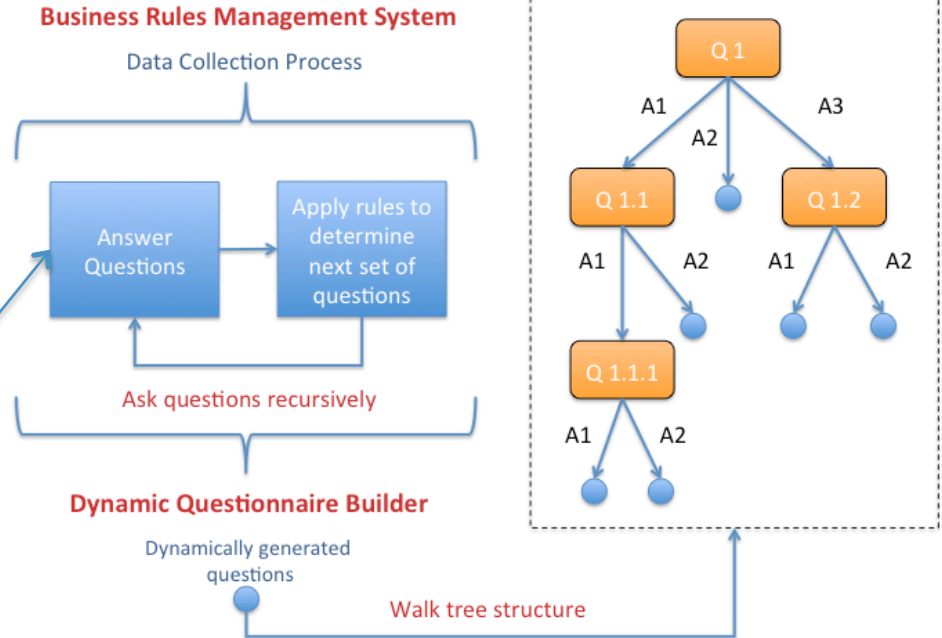
Answers to underwriting questions determine if subsequent questions are required to determine eligibility, level of risk, and rating.

Homeowner's Policy Example Questions

Q1: Do you have a pool at your home?
A1: Yes

Q1.1: Do you have a fence around the pool?
A1: Yes

Q1.1.1: How high is the fence (0-5ft, 5-10ft, 10+)?
A2: 5-10ft



Other Business Considerations

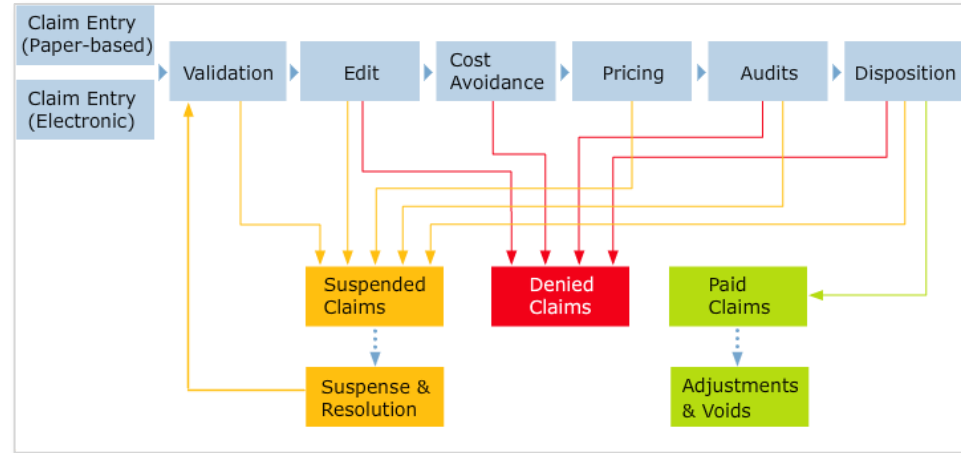
Not just for application submission

- First Notice of Loss
- Claim Adjudication

What about Mobile?

- Easily applied to mobile platforms too
- Subscribe to the Vizuri Blog to find out when our Red Hat Mobile version is available.

RED HAT®
MOBILE APPLICATION
PLATFORM



“An Open View” <http://blog.vizuri.com>



RED HAT® JBOSS®
MIDDLEWARE

Implementing an Insurance Application Questionnaire using JBoss BRMS

Proof-of-Concept

Dynamic Questionnaire Goals

Has any insurer or agency canceled or refused to issue or renew similar insurances to the named applicant or any household member within the past 3 years?

PROPERTY

Street Address	<input type="text" value="13880 Dulles Corner Ln"/>
City	<input type="text" value="Herndon"/>
State	<input type="text" value="Virginia"/>
Zip Code	<input type="text" value="20171"/>
When would you like your home policy to begin?	<input type="text" value="08/01/2015"/>
What is the home purchase date?	<input type="text" value="08/01/2015"/>
Year Built	<input type="text" value="1915"/>
Approximate Living Area	<input type="text" value="150"/>
Approximate age of roof	<input type="text" value="50"/>
Has the Electric System completely renovated?	<input type="button" value="No"/>
Are there any home safety devices?	<input type="button" value="Yes"/>
Do you have any previous claims?	<input type="button" value="No"/>
Are there any dogs?	<input checked="" type="button" value="No"/>
Is there any child care business conducted on the premises ?	<input type="button" value="No"/>

AVAILABLE TASKS

Required Field Value are not present.

QUOTE MESSAGES

INFORMATION

ERRORS

Quote Status :

Dynamic Questionnaire Goals

Question Definitions

Answers that trigger question state

Has any insurer or agency canceled or refused to issue or renew similar insurances to the named applicant or any household member within the past 3 years? No

PROPERTY

Street Address

City

State

Zip Code

When would you like your home policy to begin?

What is the home purchase date?

Year Built

Approximate Living Area

Approximate age of roof

Has the Electric System completely renovated? No

Are there any swimming pools on the premises? Yes

Do you have any previous claims? No

Are there any dogs? No

Is there a child, grandchild, or other person on the premises? No

AVAILABLE TASKS

Required Field Value are not present.

QUOTE MESSAGES

INFORMATION

Coverage Not Available For 2017

ERRORS

Year Built cannot be less than 1920

Living Area needs to be greater than or equal to 500 sq. ft.

Roof Age cannot be greater than 24 years.

Quote Status :

Validation Feedback

Rate Calculation

Homeowner's Policy Questionnaire Requirements

Questionnaire Definition

- Definition powers the view (order, type, required etc.)
- Question definitions added/updated without coding

Dynamic Question State

- Answers may hide/show/change questions

Validation Feedback

- “Simple” validation (e.g. correct data type, required values)
- “Do Not Bind” decision points (e.g. State not covered)
- Risk categorization

Rate Calculation

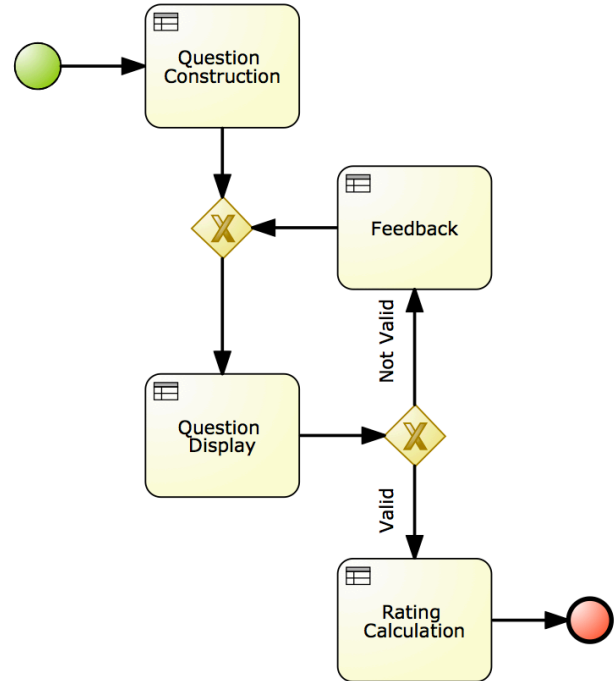
- Based on risks and attributes, what is the policy rate?



Organizing Rule Sets

Identified Phases that Rules should be grouped in

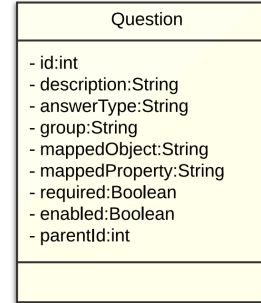
1. Question Construction – Define “blank” questionnaire
 2. Question Display – Changes to questions based on answers
 3. Feedback – Validation messages/errors for answers
 4. Rating Calculation – Policy cost determination
- Categories can be co-located at design time
 - Can execute in isolation at run time
 - Share a common domain model...



Domain Model – Nouns of the Rules

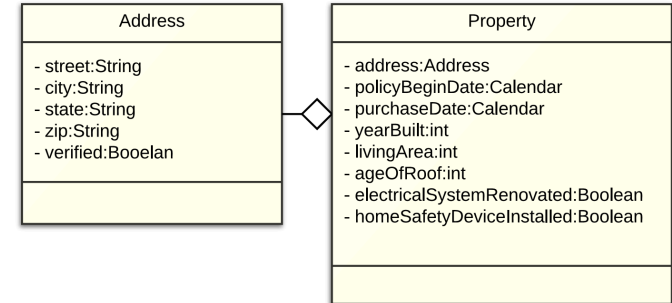
Question

- Generic Question holder
- Describes display order, data type, is required etc.
- Hierarchical: “sub-questions”



Property and Address

- Holders for answers with highly specific attributes
- E.g. roof age, has swimming pool, zip code
- Allows expressive rule authoring for display phase



Domain Model – An Interlude

“Generic” Answer Model

When $\$answer : Answer (questionId == 15, integerValue > 25)$

Then ...

“Specific” Answer Model

When $\$property : Property (roofAge > 25)$

Then ...

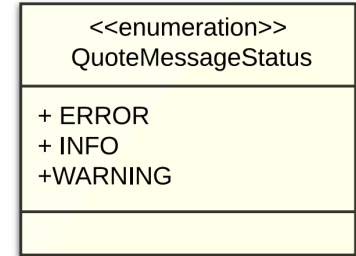
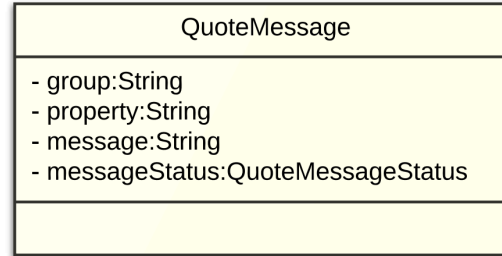
Answer
- questionId:int - rawValue:String - valueType:Enum
+ integerValue():int + booleanValue():Boolean + decimalValue():BigDecimal

Property
- address:Address - policyBeginDate:Calendar - purchaseDate:Calendar - yearBuilt:int - livingArea:int - ageOfRoof:int - electricalSystemRenovated:Boolean - homeSafetyDeviceInstalled:Boolean

Domain Model – Nouns of the Rules continued

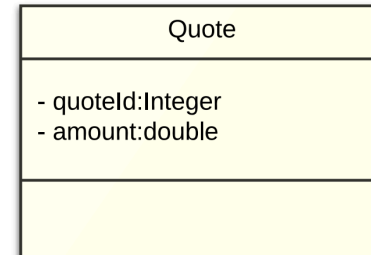
Quote Message

- Generic holder for feedback on answers
- Different severities: INFO, WARNING, ERROR
- Optionally tied to specific data point



Quote

- Simple holder for calculated premium



Rules Authoring – Technical Rules

Anatomy of an actual rule

1. Attributes – name, properties, description etc.
 2. When – Condition that activates Rule
 3. Then – Consequence that occurs when activated
- Basically, a disconnected “if then” statement
 - Declarative nature promotes breaking a problem down
 - Singularly focused, powerful as a group

```
rule "roofTooOld"  
  dialect "mvel"  
  no-loop true  
  agenda-group "quote-error-check"  
  when  
    property : Property(ageOfRoof >= 25 )  
  then  
    QuoteMessage msg = new QuoteMessage();  
    msg.setGroup("Property");  
    msg.setProperty("ageOfRoof");  
    msg.setMessage("Roof Age cannot be greater than 24 years.");  
    msg.setMessageStatus(QuoteMessageStatus.ERROR);  
  
    insert(msg);  
  end
```

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    insert(msg);  
  end
```

Rules Authoring: Guided Rules

Guided Rules

- Web based format that closely mimics the underlying Technical Rule
- Select available custom Domain Model objects from list
- Drill down through domain hierarchy and attribute lists
- Intelligently provides data inputs based on attribute types
- Great for “one-off” Rules


















WHEN	
	There is a Property with: address
1.	[not bound]:address.zip. <input type="text" value="Choose..."/>
	[not bound]:address.zip.trim(). <input type="text" value="Choose..."/>

THEN	
	Insert QuoteMessage [fact0]:
	message <input type="text" value="Coverage Not Available For 2017"/>
1.	messageStatus <input type="text" value="QuoteMessageStatus.INFO"/>
	property <input type="text" value="Address.zip"/>
	group <input type="text" value="Property"/>

Rules Authoring: Decision Tables

Decision Tables

- Web-based input with spreadsheet like format
- Good for series of similar rules
- Popular format among Analysts

	#	Description	agenda-group	Status	Dog/s Exist	Previous Claims	Risk Rate	Quote Amount
								
	<input type="checkbox"/>	1	calculation		<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	459.95
	<input type="checkbox"/>	2	calculation		<input checked="" type="checkbox"/>	<input type="checkbox"/>	10	469.95
	<input type="checkbox"/>	3	calculation		<input checked="" type="checkbox"/>	<input type="checkbox"/>	20	479.95
	<input type="checkbox"/>	4	calculation		<input checked="" type="checkbox"/>	<input type="checkbox"/>	30	489.95
	<input type="checkbox"/>	5	calculation		<input type="checkbox"/>	<input type="checkbox"/>	0	409.95
	<input type="checkbox"/>	6	calculation		<input type="checkbox"/>	<input type="checkbox"/>	10	419.95
	<input type="checkbox"/>	7	calculation		<input type="checkbox"/>	<input type="checkbox"/>	20	429.95
	<input type="checkbox"/>	8	calculation		<input type="checkbox"/>	<input type="checkbox"/>	30	439.95
	<input type="checkbox"/>	9	calculation		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	499.95
	<input type="checkbox"/>	10	calculation		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10	509.95
	<input type="checkbox"/>	11	calculation		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	20	519.95
	<input type="checkbox"/>	12	calculation		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	30	529.95
	<input type="checkbox"/>	13	calculation		<input type="checkbox"/>	<input checked="" type="checkbox"/>	0	539.95
	<input type="checkbox"/>	14	calculation		<input type="checkbox"/>	<input checked="" type="checkbox"/>	10	549.95
	<input type="checkbox"/>	15	calculation		<input type="checkbox"/>	<input checked="" type="checkbox"/>	20	559.95
	<input type="checkbox"/>	16	calculation		<input type="checkbox"/>	<input checked="" type="checkbox"/>	30	569.95

Rules Authoring: Using a “DSL”

Domain Specific Language

- Allow custom “building blocks” for Guided Rules
- Cookbook of patterns that are specific to the Condition or Consequence sections
- Can be used to hide the complexity of the Rule and Fact syntax

DSL

DSL Editor [insurance]

```
[when]If property age is {var} or more but less than {var1}= $property : Property(getAge() >= {var}, getAge() < {var1}, getRiskRate() == 0)  
[then] Set property risk rate to {var}= $property.setRiskRate({var}); update ($property);
```

Guided Rule with DSL

Guided Rule Editor [RiskRateRule_10]

EXTENDS None selected

WHEN

1. If property age is or more but less than

THEN

1. Set property risk rate to

(options)

Attributes:

dialect

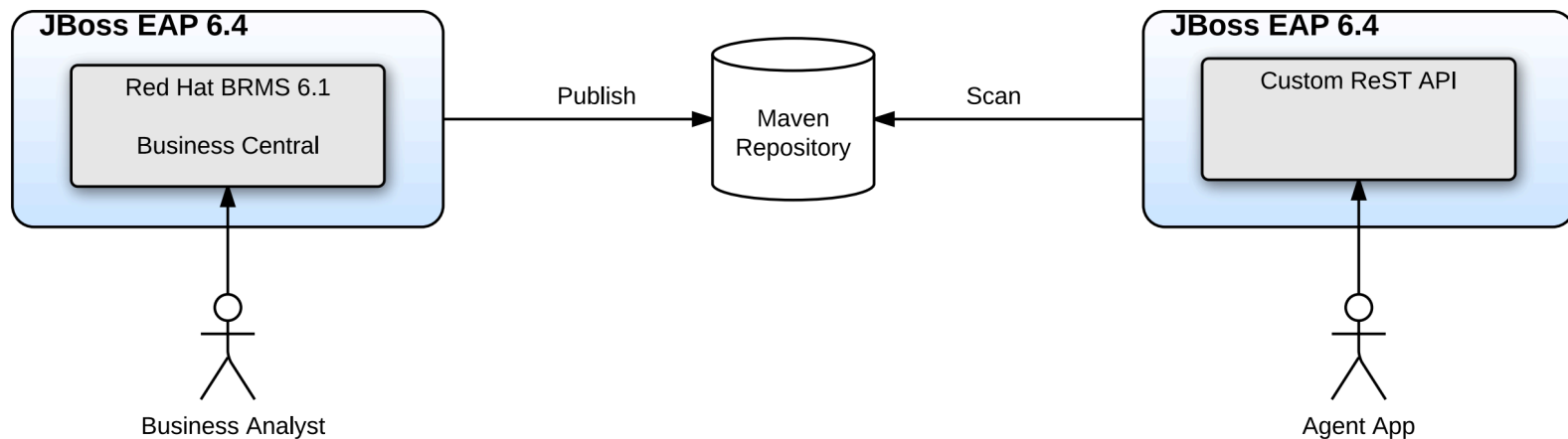
no-loop

agenda-group

High Level Architecture: Design/Deploy

Want to provide high agility to Rules changes

- Scan and detect changes without redeployment of server
- Rules project compiled into specialized JAR
- Published and resolved using Maven constructs



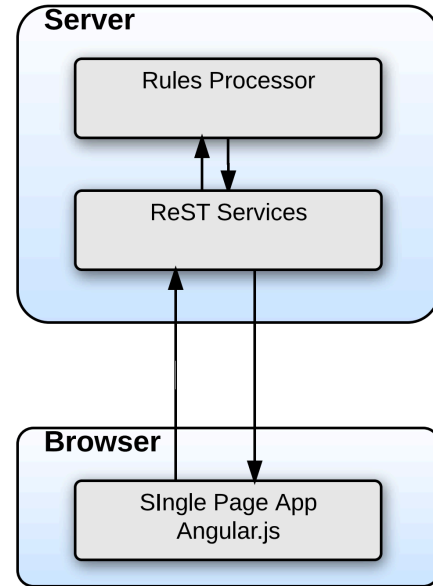
Architectural Goals: Decoupled Runtime

Rules wrapped in custom ReST API

- Want UI decoupled from Rules execution
- Want to free technology choices up for rest of system
- Growing number of BRMS customers are not Java-centric and have embraced polyglot IT environments

Business-centric API

1. Initialize questionnaire
2. Update questionnaire
3. Check Eligibility
4. Calculate Rate



<demo />

Thank You

Questions?

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