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A Comparison Framework for Rule Engines

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National Science Foundation

I. Research Overview and Outcome

Problem Statement

- Rule engines have varying features
- Rule engines all have their own proprietary rule storage formats
- Different application domains have different requirements and needs, for example
  - Finance
  - Healthcare

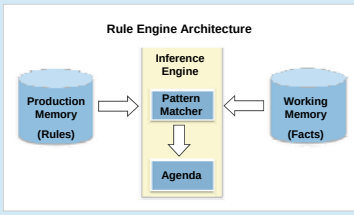
Research Objectives

- Examine the various rule engines in order to determine their features
- Determine necessary features for rule engines
- Study the specific characteristics needed of rule engines for the healthcare and finance application domains. Specifically to determine:
  - The features that are necessary in a rule engine
  - Each feature's priority level, as in how important they are in the rule engine
- Use the general and specific domain requirements as an evaluation benchmark
- Develop a comparison framework in order to determine the optimal rule engine for a particular application domain

Rule Engine Architecture

Based on Three Main Components

1. Production Memory – Stores the Rules
2. Working Memory – Stores the Facts
3. Inference Engine



Advantages of Rule Engines / BRMS[2]

- Empower business users to manage rules
  - No programming knowledge needed
- Develop object models that incorporate external data sources
  - Such as databases and XML schemas
- Use visual layout tools to create complex rule-driven process flows
  - Such as conditional branching and functions
- Personalize business processes and portals
  - Integrate user-specific data displays and interactive dialogs
- Deploy rule systems that are highly scalable
  - Result in exceptional performance on various platforms

Rule Engines Examined

Commercial Rule Engines / BRMS

- WebSphere ILOG JRules
- Fair Isaac Blaze Advisor

Open Source Rule Engines / BRMS

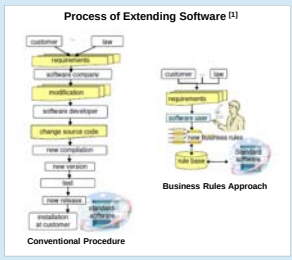
- JBoss Drools
- OpenRules

Research Environment

- Eclipse Based Environments
  - JBoss Drools
  - ILOG JRules
- Stand Alone Software
  - Blaze Advisor - Builder

Why Do We Use Rule Engines?

- Separates business rules from the system and processes
  - Makes it easier to update and change
- Rules are easy to understand
  - Can be written using natural language (English-like or Chinese-like)
  - Can be edited by business people without the help of developers
- Centralizes the knowledge
  - Stored in an executable rule base
  - Represent the business strategy
- Allow both business and IT users to manage the rules that drive business
  - Business people can use business logic
  - IT users can use either business logic or traditional code
- Faster rollout than traditional software development
  - Saves time and money
- Allows for more flexibility in pricing and services



Selected Rule Engine Architecture

ILOG JRules

- **Rule Team Server** – For Business Users
  - Define and edit business rules using a web based interface
- **Rule Studio** – For Developers
  - Eclipse based environment that you can use to effortlessly switch between Java and rules
  - Debug transitions seamlessly between source and rule engine
- **Rule Scenario Manager** – For Business Users & Developers
  - Create and manage tests scenarios to verify business rules
  - Simulate the effect of business policy changes
- **Rule Execution Server** – For System Administrators
  - Safely deploy and monitor rule applications
  - Supports every major runtime platform.

JBoss Drools

- **Drools Guvnor**
  - BRMS/BPMS
- **Drools Expert**
  - Rule engine
- **Drools Flow**
  - Mange process and workflow
- **Drools Fusion**
  - Temporal reasoning
  - Declarative modeling of types

Future Work

Some of the future work would involve the following:

- Study the features of the representative rule engines, such as
  - Drools
  - ILOG JRules
- Study the particular features that pertain to a particular application domain, such as
  - Healthcare
  - Finance
- Generate a comparison framework to determine the rule engine most applicable for a particular application domain

II. International Experience in China

Tsinghua University (清华大学)

We spent two months living and working in Beijing, China at the prestigious Tsinghua University. During our stay we were immersed in a culture like no others. This unique opportunity gave us memories that will last a lifetime and allowed us to make lifelong friends.

One of the excellent things about Beijing, China is the wide availability of public transportation, which is extremely useful considering the size of the city. Taxis are very prevalent and you can use them to travel anywhere in the city. However, if you want to save money, the buses and subway lines are inexpensive and efficient ways to get around. You also get used to riding a bike or walking, especially at Tsinghua University since the campus is so vast.

Another thing that we noticed is that delicious food is never in short supply. Whether you go out with friends, your international collaborators, or your professors you'll be treated with excellent food and will always leave the restaurant full. Sure it might be abnormal to order something using only a picture as a guide, but you'll get used to it and you'll realize that nothing beats authentic Chinese food.

Web and Technology R&D Center

Upon arriving in China, one of the first things we experienced was the kindness of the Chinese people. From our international collaborators, to our professors, and the students at Tsinghua University, people from all walks of life were willing to help us out whenever we were in need. This was a welcome sign and helped us out tremendously as we were in a country with a vastly different language. In our lab, I worked with Shang Jia (M.Sc. student) and several other students in the lab. They helped me with literature searches and got my environment setup. Their hard working ethics and dedication to their work inspired me to continue perusing my Masters degree.

The FIT Building (Where We Worked)

Places to Visit

One thing we realized is that you'll never run out of places to visit in China. In fact you probably won't have nearly enough time to visit everything on your list.

Some of the highlights include:
- **The Beijing Zoo** (北京动物园)
- **Summer Palace** (颐和园)
- **Forbidden City** (故宫)
- **The Bird's Nest** (鸟巢)

"The Bird's Nest" – Beijing National Stadium

The Summer Palace

Overlooking The Forbidden City

Panda Bear at the Beijing Zoo

Xi'an (西安)

Xi'an is one of the four great ancient capitals of China and is home to the world famous Terracotta Army Museum. Since Xi'an is located approximately 750 miles from Beijing, China you have to take an overnight sleeper train to get there, which takes almost 12 hours.

The Terracotta Warriors

A Chariot & Four Bronze Horses

Upon arriving we visited the Xi'an City Wall, the Bell & Drum Tower, and various other sites. The highlight of the trip was taking a tour of the Terracotta Army Museum, which is home to the Terracotta Warriors. Being able to see the Terracotta Warriors up close was worth the visit and was simple amazing.

Although, at first we had a little difficulty finding the De Fe Chang Dumpling Restaurant, it was worth the wait. Not only do they serve the best dumplings that I have ever eaten, they are all shaped differently to coincide with their ingredients.

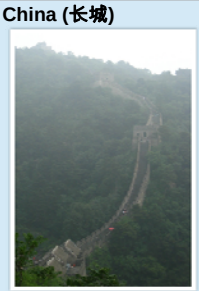
World Famous De Fe Chang Dumpling Restaurant

The Great Wall of China (长城)

No trip to China is complete without a visit to the Great Wall. We happened to visit the Mutianyu section, which is much more secluded and quieter than the popular Balding section.

Upon arriving the wall is much steeper and more elevated than you would imagine. Although, this is not the best image of the Great Wall, it was the best we could get due to the mountainous terrain and the fog.

Being able to see the Great Wall in person is a spectacular experience it even more awe-inspiring and marvelous in person.



The Great Wall of China at Mutianyu

III. Acknowledgement

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IV. References

[1] Lämmel, Uwe. *"A Grid Service Infrastructure for Mobile Devices."* *3rd Conference on Baltic Business and Socio-Economic Development BBSED 2007, Tallinn*, 17.-20. June 2007, Estonia

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