Implementing the UServ Product Derby with the TAKE rule compiler

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Two versions

Version 1 – static compilation, no external fact sources used – can be started from TAKE web page (requires Java WebStart 1.6).
http://code.google.com/p/take
Subversion:
http://take.googlecode.com/svn/trunk/RuleML2007_challenge/

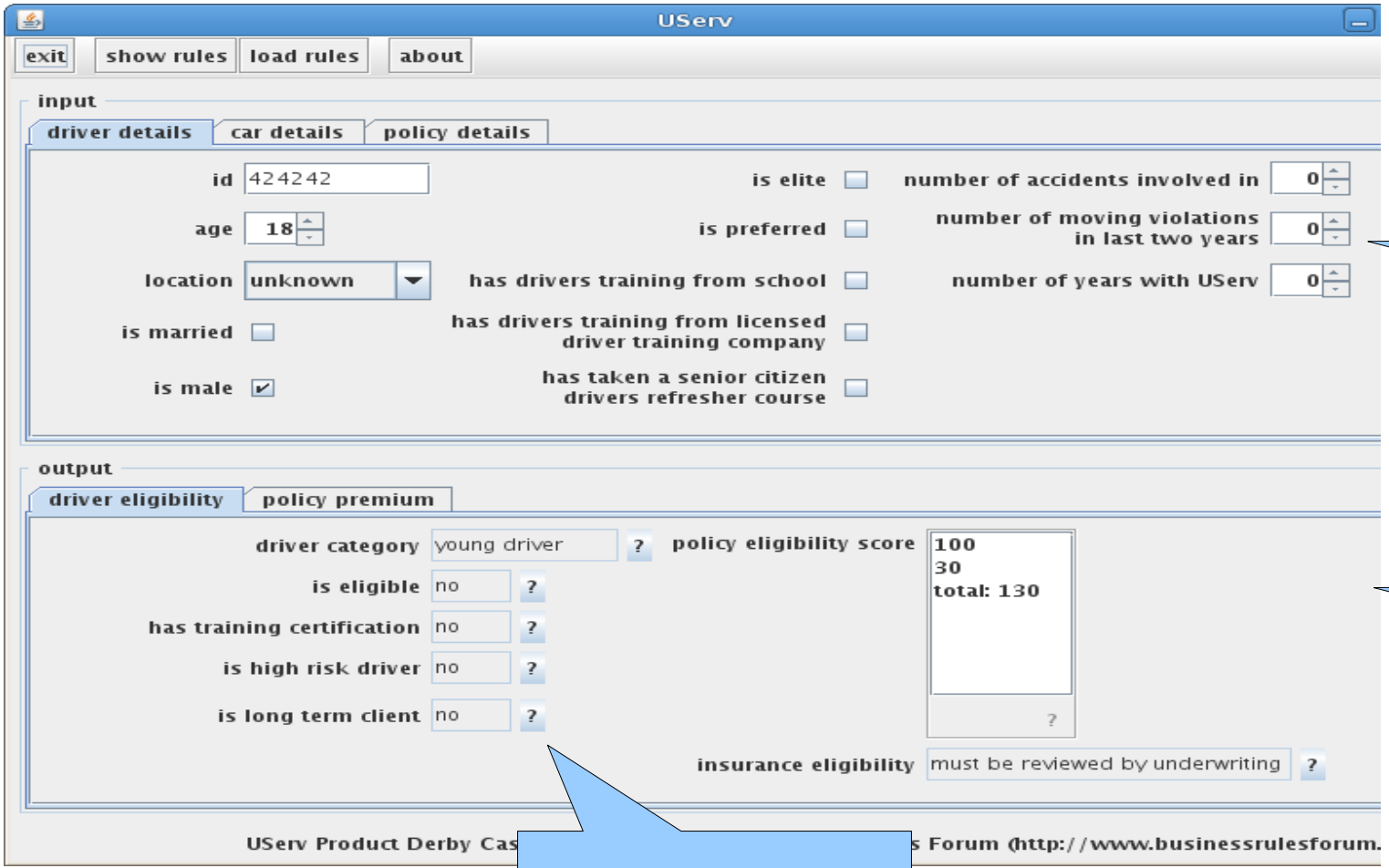
Version 2 – dynamic compilation, uses facts from lightweight web service and DB.
I.e., rules are compiled when loaded!
Subversion:
http://take.googlecode.com/svn/trunk/RuleML2007_challenge/

About the Scenario

- UServ Product Derby Case Study
- Car insurance rules
- published by the business rule forum to benchmark rule applications
- http://www.businessrulesforum.com/2005_Product_Derby.pdf
- 69 rules -> 111 source code files, 354 classes
- Compilation takes 2567 ms on a system with a 2.0GH T5600 dual core processor, 2.0GB of RAM running on Ubuntu 7.10 with Java 1.6.
- Handicaps: loggings switched on, code pretty printing

The Application

- Simple UI
- Changes in input area cause changes in output area – queries are reissued.



Rule Implementation

- Now uses TAKE scripts, R2ML version planned.
- Comprehensive use of meta data in scripts.
- Meta data can be retrieved in application (use [?] buttons).

Access Resource from DB

- List of special locations is read from HSQL DB
- External fact store wraps a JDBC result set

```
@author=Jens Dietrich
@date=2007-10-18
@description=list of special locations
    external DP_00x: specialLocation[Driver]
@category=Driver Premiums Rule Set
@author=Jens Dietrich
@date=2007-09-12
@description=If young driver and married and located in special
    location, then increase premium by $700.
DP_01: if driverCategory[driver,"young driver"] and isMarried[driver] and
   specialLocation[driver] then additionalDriverPremium[driver,700]
```

Access Resources from WebService

- DUI conviction lookup implemented as web service
- dummy web service returns a boolean for an id (id contains 42 – must have a DUI conviction)
- RESTful – simple GET request, not SOAP

```
@author=Jens Dietrich
@date=2007-09-12
@description=If the driver has been convicted of a DUI, then the driver
  qualifies
  as a High Risk Driver.
DE_DRC01: if hasBeenConvictedOfaDUI[driver] then
  isHighRiskDriver[driver]
@author=Jens Dietrich
@date=2007-10-19
@description=get info about DUI conviction from external data source
external DRCx: hasBeenConvictedOfaDUI[Driver]
```

Built in aggregation

- Functions can be defined using standard` aggregation functions
- similar to GROUP BY construct in SQL

aggregation eligibilityScore = **sum** x **policyEligibilityScore**[car,driver,x]

@author=Jens Dietrich
@date=2007-09-12
@description=If car is Provisional then increase policy eligibility score by 50.
ES_01b: if autoEligibility[car,"provisional"] then **policyEligibilityScore**[car,driver,50]

@author=Jens Dietrich
@date=2007-09-12
@description=If eligibility score is less that 100, then client is eligible for insurance.
ES_04: if **eligibilityScore**(car,client)<100 then insuranceEligibility[car,client,"eligible"

Negation

- Negation is polymorphic
- In predicate is defined in object model, negation is explicit
- Otherwise, negation is negation as failure

explicit negation – predicate references Java property

@description=If the car has Driver and Passenger airbags then lower the premium by 15%.

AD_02: if hasAirbags[car] and hasFrontPassengerAirbag[car] and **not** hasSidePanelAirbags[car] then premiumDiscount[car,15]

NAF – negated predicate is defined by rules

@description=Driver is a Typical Driver is all of the following are true: Not a Young Driver,Not a Senior Driver.

DP_07: if **not** driverCategory[driver,"young driver"] and **not** driverCategory[driver,"senior driver"] then driverCategory[driver,"typical driver"]

Reloading Rules

- Will trigger recompilation.
- Generated rules are stored in ./takeWorkingDir/src
- Compiled rules are stored in ./takeWorkingDir/bin
- package name contains timestamp for versioning
- Rules loaded with URLClassLoader into application

Reloading Rules - code

```
KnowledgeBaseManager<UservRules> kbm =
    new KnowledgeBaseManager<UservRules>();
Bindings bindings = new SimpleBindings();
bindings.put("HighTheftProbabilityAutoList",HighTheftProbabilityAutoList.getList()
   );
bindings.put("CurrentYear",new GregorianCalendar().get(Calendar.YEAR));
bindings.put("NextYear",new GregorianCalendar().get(Calendar.YEAR)+1);
Bindings factStores = new SimpleBindings();
factStores.put("DP_00x", new SpecialLocationsSource());
factStores.put("DRCx", new DUIConvictionInfoSource());
FileInputStream in = new FileInputStream(“userv.take”);
UservRules kb = kbm.getKnowledgeBase(
    UservRules.class,
    ScriptKnowledgeSource(in),
    bindings,
    factStores);
```