Comparing Open Vocabulary English and OMG SBVR

Application Semantics via Next Generation Business Rules

Adrian Walker

www.executable-english.com

Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

Aligning IT and Business

- Aligning IT strategy with business strategy has been one of the top three issues confronting IT and business executives for more than 20 years

- Polling of CIOs and business executives conducted in 2004 revealed that aligning IT and business goals remains their No. 1 or 2 priority

-- Forrester

Aligning IT and Business

- The stakeholders in a business IT project are usually a diverse group of people
- They can all converse, read, and write in English (or Spanish, French…)
- Smarter rules technology may be able to better exploit English communication

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Making Smart Connections

Good things happen when we make smart connections:

Making Smart Connections

Good things happen when we make smart connections:

Software--------- ----------hardware

Making Smart Connections

Good things happen when we make smart connections:

Software--------- **Linux** ----------hardware

Making Smart Connections

Good things happen when we make smart connections:

Software--------- **Linux** ----------hardware

People---------- ----------all the web page on the net

Making Smart Connections

Good things happen when we make smart connections:

Software--------- **Linux** ----------hardware

People---------- **Google** ----------all the web page on the net

Making Smart Connections

Good things happen when we make smart connections:

Software--------- **Linux** ----------hardware

People---------- **Google** ----------all the web page on the net

Buyers---------- ----------sellers

Making Smart Connections

Good things happen when we make smart connections:

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Buyers---------- **Ebay** ----------sellers

Making Smart Connections

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Buyers---------- **Ebay** ----------sellers

Business analysts-------- ---------networked databases

Making Smart Connections

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Software--------- **Linux** ----------hardware

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Business analysts-------- **Smart Rules Systems** --------networked databases

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Application Semantics via Next Generation Business Rules

Current rule systems:

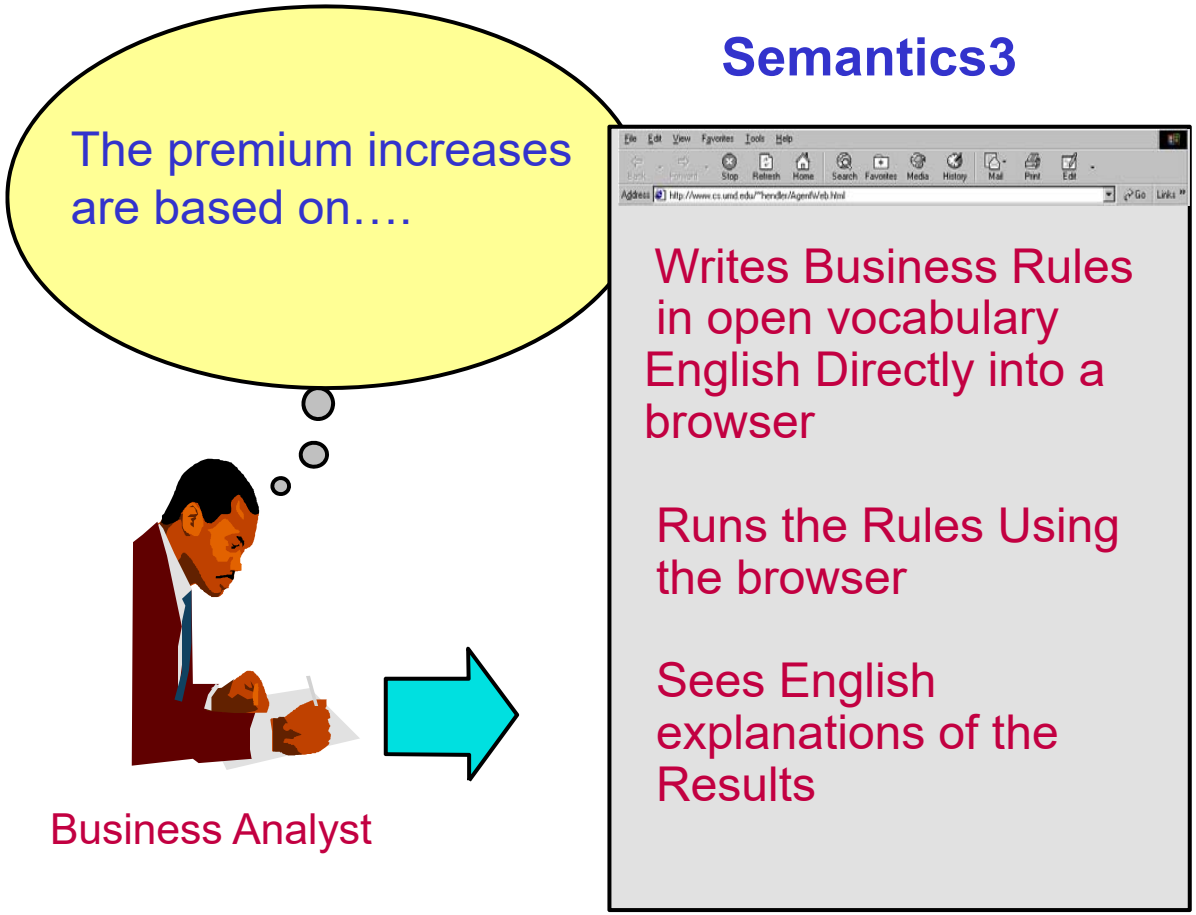
- Rules are either forward chaining or back chaining
- A collection of rules is a program
- If you change the order of the rules you will get different results
- If the user interface deals with English, then there is a dictionary and a grammar in the system
- For rules to work efficiently over a database, someone must write and maintain SQL queries
- If you want explanations from a rule system, you must annotate the rules in English

Application Semantics via Next Generation Business Rules

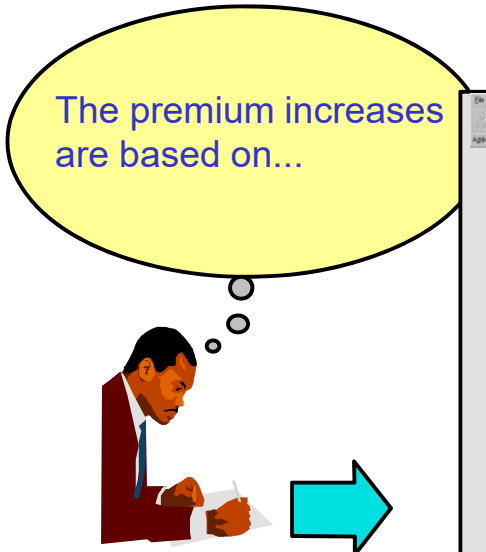
Three kinds of semantics:

- **Semantics1** is "Data Semantics" as in a relational database, XML or RDF
- **Semantics2** specifies what a rule engine should do
- **Semantics3** is Application Semantics -- the meaning of English concepts at the author- and user-interface

Application Semantics via Next Generation Business Rules

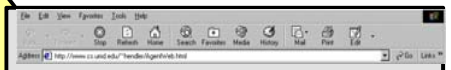


Application Semantics via Next Generation Business Rules



Business Analyst

Semantics3

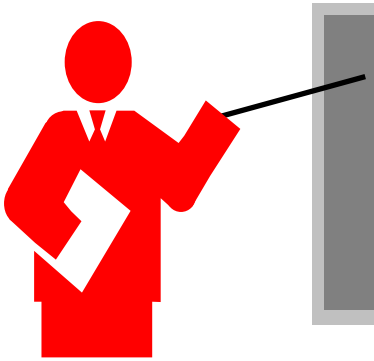


Writes Business Rules in open vocabulary English Directly into a browser

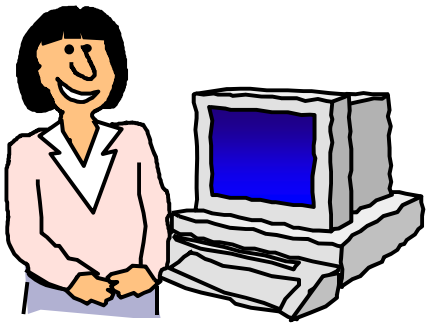
Runs the Rules Using the browser

Sees English explanations of the Results

Semantics2

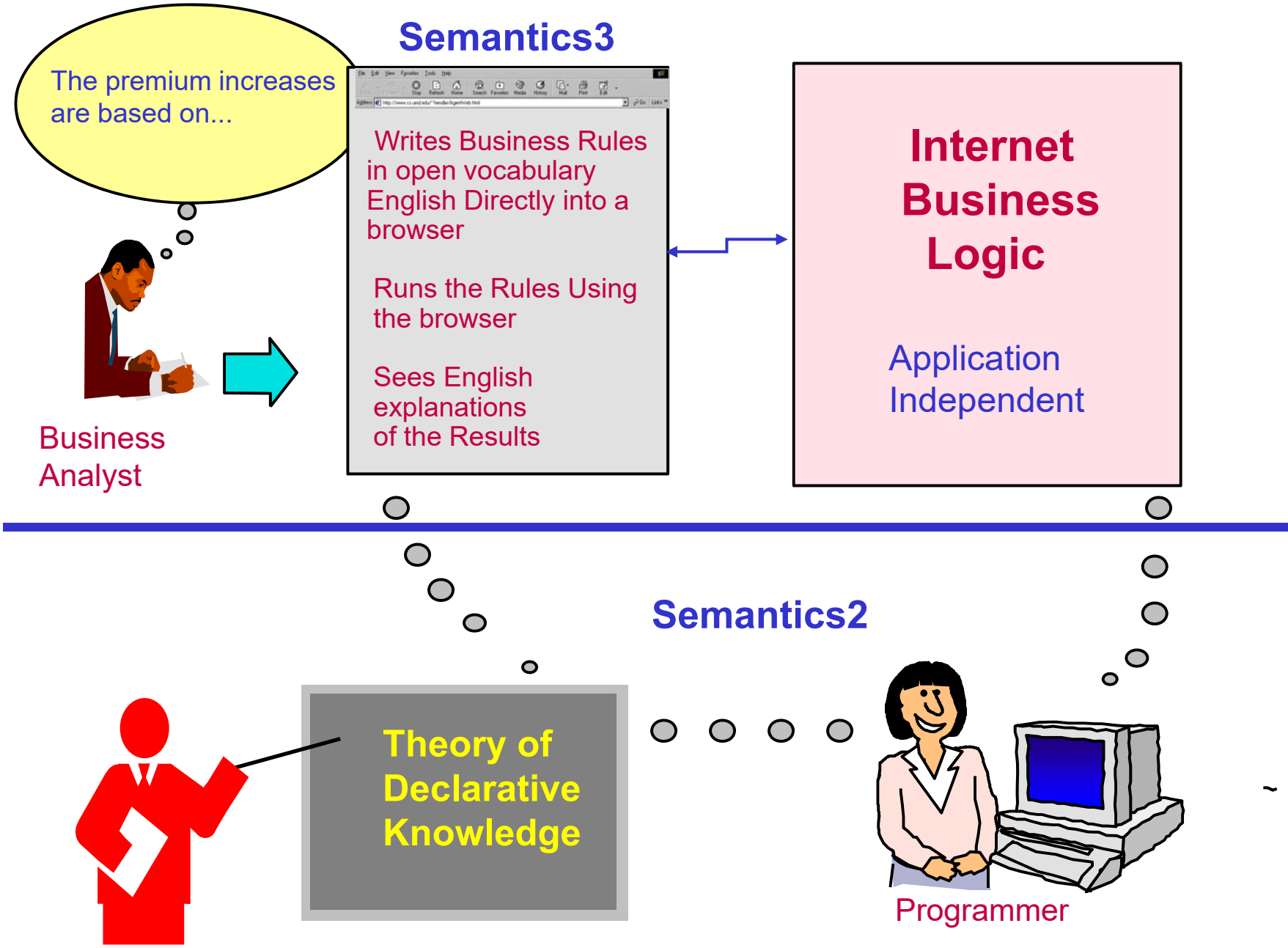


Theory of Declarative Knowledge

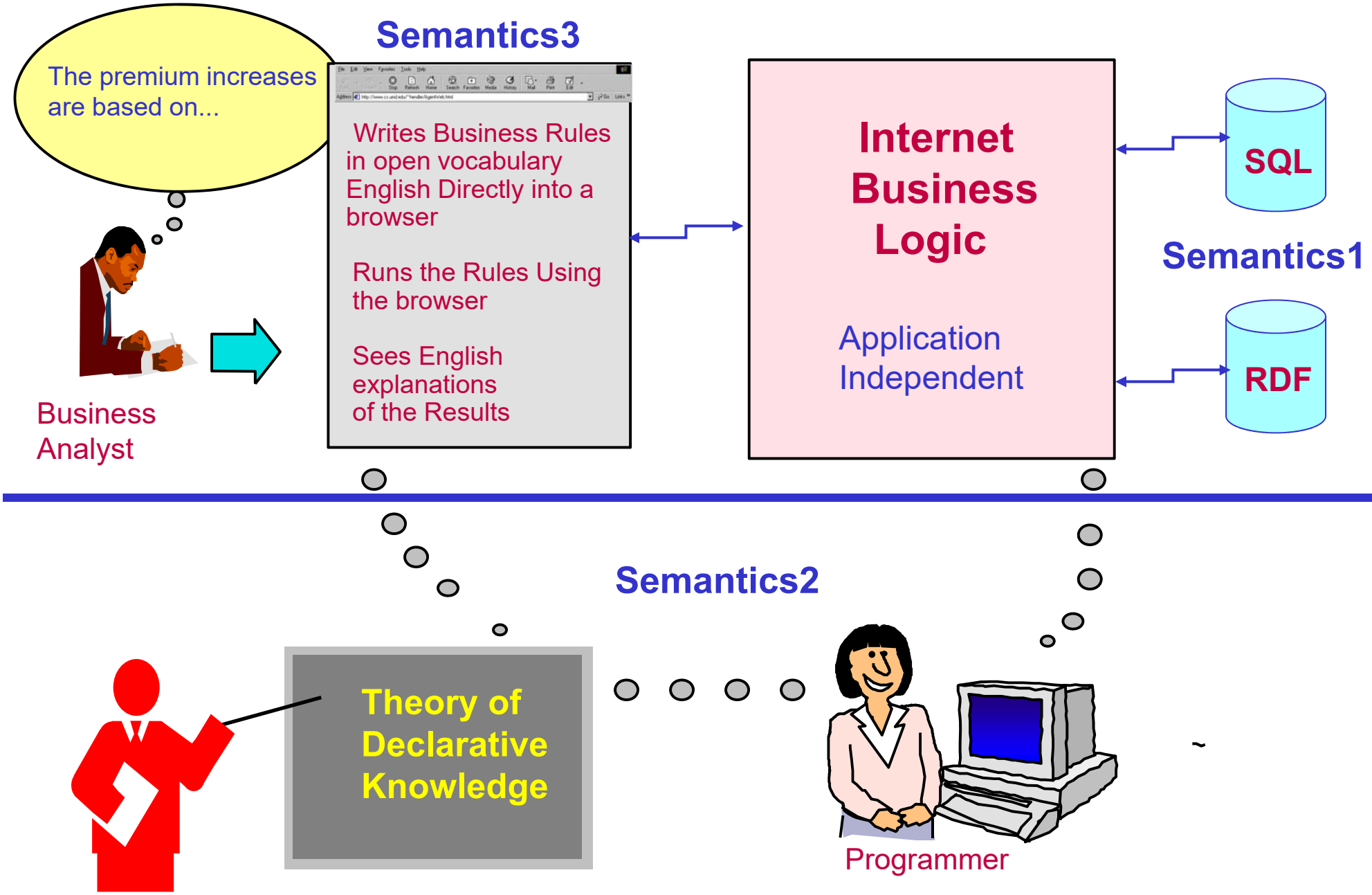


Programmer

Application Semantics via Next Generation Business Rules



Application Semantics via Next Generation Business Rules



Application Semantics via Next Generation Business Rules

Smarter rule systems:

- Rules are either forward chaining or back chaining
- Rules simply mean what they say
- A collection of rules is a program specification
- If you change the order of the rules you will get different the same results
- If the user interface deals with English, then there is a there need be no dictionary and a or grammar in the system
- For rules to work efficiently over a database, someone must write and maintain SQL queries can be generated and run automatically from the rules
- If you want explanations from a rule system, you must need not annotate the rules in English

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Application Semantics via Next Generation Business Rules

Insurance -- UServ Product Derby Case Study:

Requirement:

If young male driver and single and not located in CA, NY or VA, then increase premium by $300.

Rule

person some-CID some-name is classified in driver eligibility as Young Driver
person that-CID that-name has Marital Status Single in his or her description
not : person that-CID that-name resides in a state that is exceptional for driver premium purposes

---

person that-CID that-name is subject to a $ 300 premium increase

Facts

this-state is exceptional for driver premium purposes
==========
CA
NY
VA

To view, run and change this example, please point a browser to executable-english.com and select InsuranceCaseStudy1

Application Semantics via Next Generation Business Rules

Insurance -- UServ Product Derby Case Study

Running the rules to get an answer:

person this-CID this-name is subject to premium increases totaling $ this-total

CID1	Sara Klaus	0
CID2	Spenser Klaus	300
CID3	Mark Houston	0
CID4	Angie Houston	300

To view, run and change this example, please point a browser to executable-english.com and select InsuranceCaseStudy1

Application Semantics via Next Generation Business Rules

Insurance -- UServ Product Derby Case Study -- An explanation:

person CID2 Spenser Klaus has a description file

sum an-amount : person CID2 Spenser Klaus is subject to a $ an-amount premium increase = 300

---

person CID2 Spenser Klaus is subject to premium increases totaling $ 300

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Insurance -- UServ Product Derby Case Study -- An explanation:

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person CID2 Spenser Klaus is subject to a $ 300 premium increase

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Application Semantics via Next Generation Business Rules

Insurance -- UServ Product Derby Case Study -- An explanation:

person CID2 Spenser Klaus has a description file
sum an-amount : person CID2 Spenser Klaus is subject to a $ an-amount premium increase = 300

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person CID2 Spenser Klaus is subject to premium increases totaling $ 300

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person CID2 Spenser Klaus has Marital Status Single in his or her description
not: person CID2 Spenser Klaus resides in a state that is exceptional for driver premium purposes

---

person CID2 Spenser Klaus is subject to a $ 300 premium increase

person CID2 Spenser Klaus has Sex Male in his or her description
person CID2 Spenser Klaus has Age 17 in his or her description
17 is less than 25

---

person CID2 Spenser Klaus is classified in driver eligibility as Young Driver

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Car Rental: EU-Rent is a (fictitious) company with branches in several countries.

Requirement: Assign a car to a rental reservation

Rule:

```
for demo purposes the current date and time is some-date some-time
EU-rent customer some-Cnumber some-name has rental some-Rnumber
      starting that-date some-time1 ending some-date2 some-time2
not : rental number that-Rnumber has a car assigned to it
rental that-Rnumber is for a car some-group with pick up at some-branch1 and return at some-branch2
car some-car in group that-group is currently available at branch that-branch1
add : rental number that-Rnumber is assigned that-car
-------------------------------------------------------------------------------------------------------------------
ASSIGN car that-car in group that-group to rental number that-Rnumber for customer that-Cnumber that-name
```

To view, run and change this example, please point a browser to executable-english.com and select EU-rent2

Application Semantics via Next Generation Business Rules

Car Rental:

Running the rules to get an answer

ASSIGN car this-car in group this-group to rental number this-Rnumber for customer this-Cnumber this-name

==========

CAR103 group 3 R1409 C34 Adrian Walker

To view, run and change this example, please point a browser to executable-english.com and select EU-rent2

Application Semantics via Next Generation Business Rules

Car rental -- an explanation of a transaction before it is made

for demo purposes the current date and time is 20030610 1345
EU-rent customer C34 Adrian Walker has rental R1409 starting 20030610 0800 ending 20030611 1450
not: rental number R1409 has a car assigned to it
rental R1409 is for a car group 3 with pick up at branch 3 and return at branch 3
car CAR103 in group group 3 is currently available at branch branch 3
add : rental number R1409 is assigned CAR103

ASSIGN car CAR103 in group group 3 to rental number R1409 for customer C34 Adrian Walker

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Application Semantics via Next Generation Business Rules

Car rental -- an explanation of a transaction before it is made

for demo purposes the current date and time is 20030610 1345
EU-rent customer C34 Adrian Walker has rental R1409 starting 20030610 0800 ending 20030611 1450
not: rental number R1409 has a car assigned to it
rental R1409 is for a car group 3 with pick up at branch 3 and return at branch 3
car CAR103 in group group 3 is currently available at branch branch 3
add : rental number R1409 is assigned CAR103

ASSIGN car CAR103 in group group 3 to rental number R1409 for customer C34 Adrian Walker

EU-rent currently owns CAR103
not: CAR103 is currently rented out
car CAR103 is in the group group 3
car CAR103 is currently owned by branch branch 3

---

car CAR103 in group group 3 is currently available at branch branch 3
…..

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Application Semantics via Next Generation Business Rules

Business Intelligence -- Mining coded medical data

Requirement: look for overlapping in-patient and out-patient treatments
that may be medically inconsistent

Rule:

```
patient some-number date some-start1 some-fin1 had in-patient treatment for some-condition1
patient that-number date some-start2 some-fin2 had out-patient treatment for some-condition2
the period that-start1 to that-fin1 overlaps with the period that-start2 to that-fin2
-----------------------------------------------------------------------------------------------
patient that-number had in-patient treatment that-condition1 overlapping
      with out-patient treatment that-condition2
```

Coded Medical Data:

eg-lno	eg-ccprod	eg-cohort	eg-contract	eg-branch	eg-control	eg-cvgcd	eg-days	eg-daylast	eg-daynext
1	N	8	0	BCA	13660	3	2	0	0
2	N	8	0	BCA	13660	3	2	0	0
3	N	1	0	BCA	13660	3	3	0	0
….									

To view, run and change this example, please point a browser to executable-english.com and select Medmine2

Application Semantics via Next Generation Business Rules

Business Intelligence -- Mining coded medical data -- Running the rules to get an answer

Answer:

patient this-number had in-patient treatment this-conditn1 overlapping with out-patient treatment this-conditn2

521049571	Antepartum, Med Complica	Cataract (Chronic)
521049571	Antepartum, Med Complica	Female infertility (Acute)
521049571	Chemotherapy	Female infertility (Acute)
521049571	Pelv Evis,Rad Hyst,Vulv	Cataract (Chronic)
521049571	Pelv Evis,Rad Hyst,Vulv	Female infertility (Acute)

To view, run and change this example, please point a browser to executable-english.com and select Medmine2

Application Semantics via Next Generation Business Rules

Business Intelligence -- Mining coded medical data -- An explanation

patient 521049571 date 910702 910703 had in-patient treatment for Antepartum, Med Complica
patient 521049571 date 900912 910928 had out-patient treatment for Female infertility (Acute)
the period 910702 to 910703 overlaps with the period 900912 to 910928

---

patient 521049571 had in-patient treatment Antepartum, Med Complica
overlapping with out-patient treatment Female infertility (Acute)

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Application Semantics via Next Generation Business Rules

Business Intelligence -- Mining coded medical data -- An explanation

patient 521049571 date 910702 910703 had in-patient treatment for Antepartum, Med Complica
patient 521049571 date 900912 910928 had out-patient treatment for Female infertility (Acute)
the period 910702 to 910703 overlaps with the period 900912 to 910928

---

patient 521049571 had in-patient treatment Antepartum, Med Complica
overlapping with out-patient treatment Female infertility (Acute)

910702 is less than or equal 910928
900912 is less than or equal 910703

---

the period 910702 to 910703 overlaps with the period 900912 to 910928

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Application Semantics via Next Generation Business Rules

Business Intelligence -- Mining coded medical data -- An explanation

patient 521049571 date 910702 910703 had in-patient treatment for Antepartum, Med Complica
patient 521049571 date 900912 910928 had out-patient treatment for Female infertility (Acute)
the period 910702 to 910703 overlaps with the period 900912 to 910928

---

patient 521049571 had in-patient treatment Antepartum, Med Complica
overlapping with out-patient treatment Female infertility (Acute)

910702 is less than or equal 910928
900912 is less than or equal 910703

---

the period 910702 to 910703 overlaps with the period 900912 to 910928

line 53 in part 1 of the Case table has an admission date corresponding to 910702
line 53 in part 2 of the Case table has number of days 1
1 day(s) after 910702 is 910703
line 53 in part 3 of the Case table has Diagnosis Related Group 383

---

the drg code 383 describes the Diagnosis Related Group Antepartum, Med Complica

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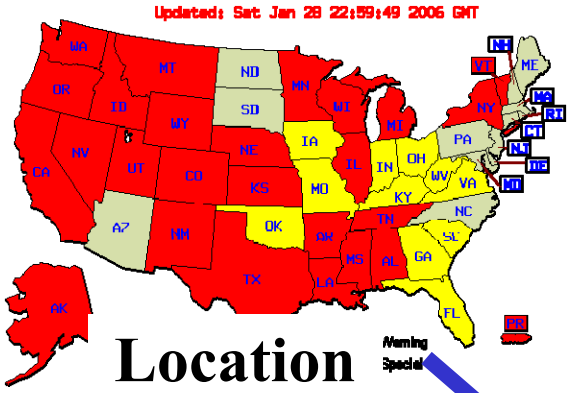
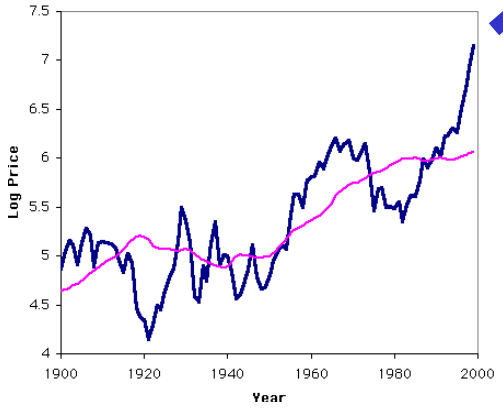
Supply Chain -- oil industry



Location

External Forces

Sales Demand November

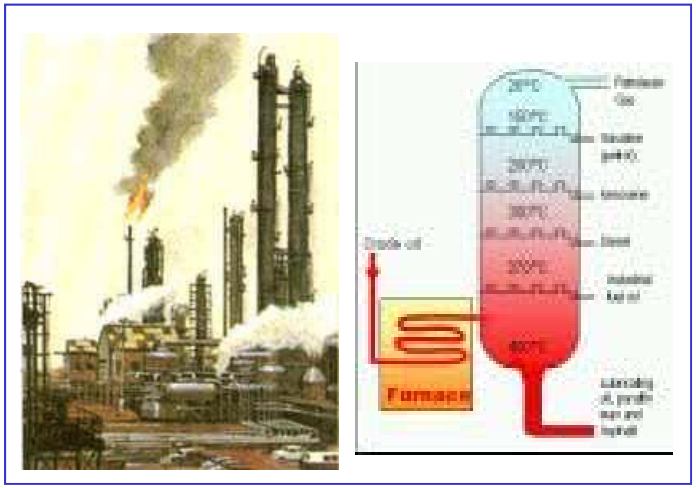


Price

Product

Application Semantics via Next Generation Business Rules

Supply Chain -- oil industry



Refinery

Terminal Storage

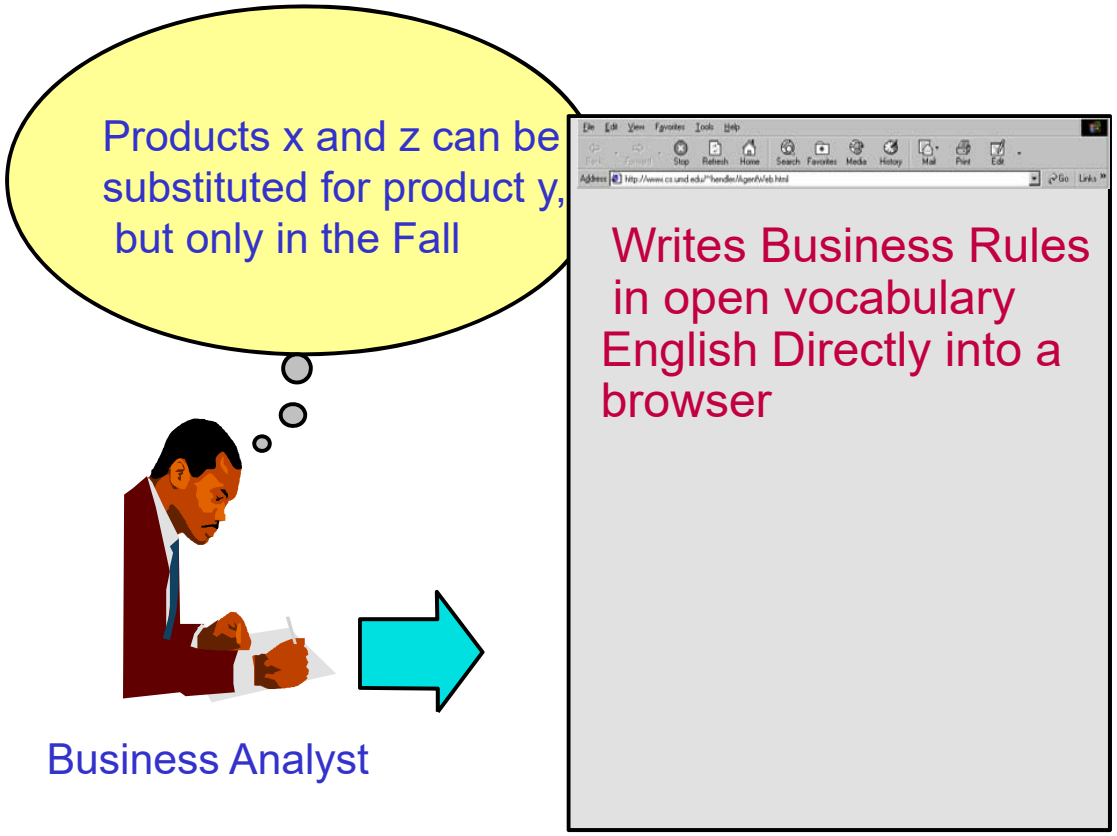
Terminal Pickup

Service Station

Application Semantics via Next Generation Business Rules

Supply Chain -- oil industry

Requirement: Meet customer demand for an oil product, given that other products may be used, depending on the season and the available transportation



To view, run and change this example, please point a browser to executable-english.com and select Oil-IndustrySupplyChain1

Application Semantics via Next Generation Business Rules

Supply Chain -- oil industry **Rules:**

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product
in some-month of some-year
for estimated demand that-id some-fraction of the order will be some-product from some-refinery
that-quantity * that-fraction = some-amount

---

for demand that-id that-region for that-quantity that-finished-product we use that-amount that-product from that-refinery

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that-quantity * that-fraction = some-amount
---
for demand that-id that-region for that-quantity that-finished-product we use that-amount that-product from that-refinery

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product
in some-month of some-year
for demand that-id for that-finished-product refinery some-refinery can supply some-amount gallons of some-product
for demand that-id the refineries have altogether some-total gallons of acceptable base products
that-amount / that-total = some-long-fraction
that-long-fraction rounded to 2 places after the decimal point is some-fraction
---
for estimated demand that-id that-fraction of the order will be that-product from that-refinery

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Application Semantics via Next Generation Business Rules

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for demand that-id that-region for that-quantity that-finished-product we use that-amount that-product from that-refinery

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product
in some-month of some-year
for demand that-id for that-finished-product refinery some-refinery can supply some-amount gallons of some-product
for demand that-id the refineries have altogether some-total gallons of acceptable base products
that-amount / that-total = some-long-fraction
that-long-fraction rounded to 2 places after the decimal point is some-fraction

---

for estimated demand that-id that-fraction of the order will be that-product from that-refinery

estimated demand some-id in some-region is for some-amount gallons of some-product in some-month of some-year
sum a-num :
for demand that-id for that-product refinery some-name can supply some-num gallons of some-product1 = a-total

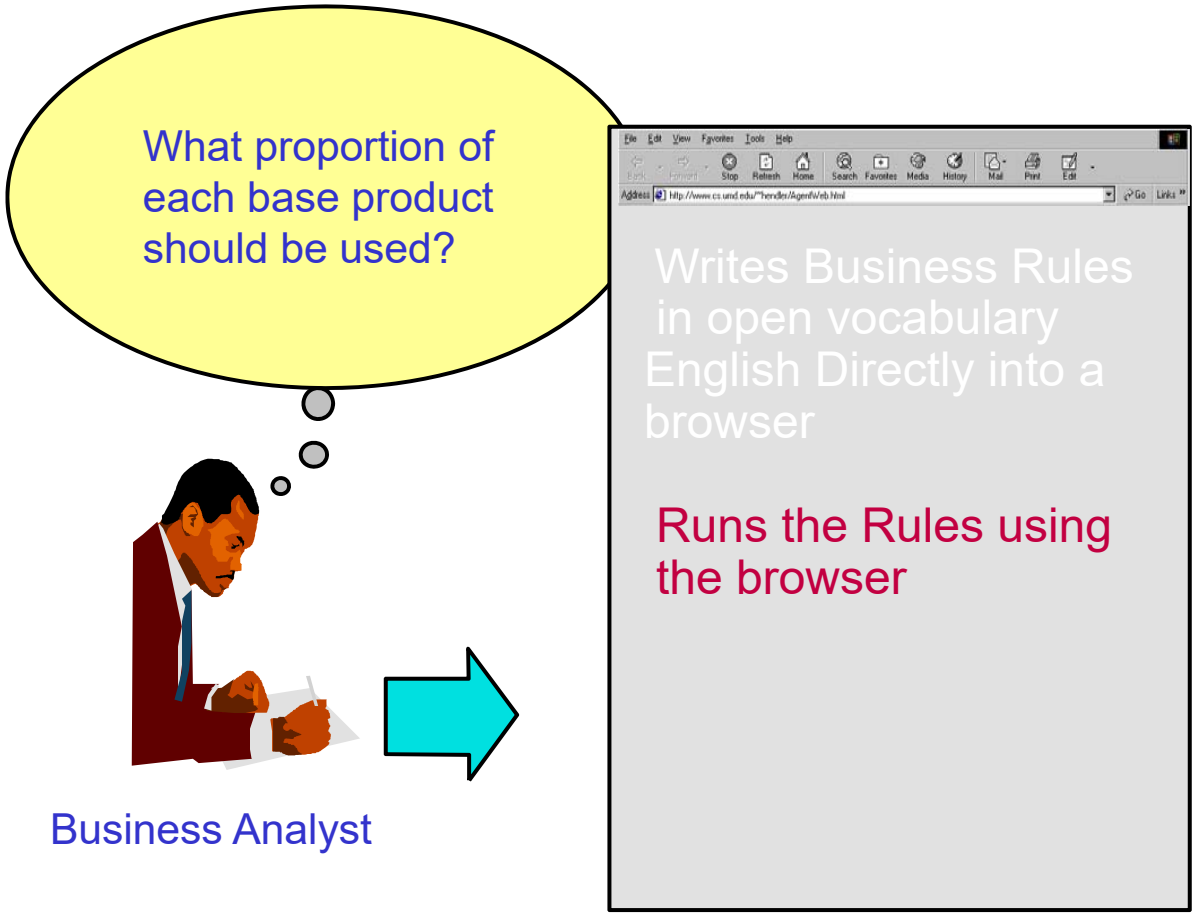
---

for demand that-id the refineries have altogether that-total gallons of acceptable base products

To view, run and change this example, please point a browser to executable-english.com and select Oil-IndustrySupplyChain1

Application Semantics via Next Generation Business Rules

Supply Chain -- oil industry**:**



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Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- answer**:**

for demand this-id this-region for this-quantity this-finished-product we use this-amount this-product from this-refinery

523	NJ	1000	product-y	190.0	product-x	Shell Canada One
523	NJ	1000	product-y	310.0	product-y	Shell Canada One
523	NJ	1000	product-y	500.0	product-z	Shell Canada One

Example based on:
"Oil Industry Supply Chain Management Using English Business Rules Over SQL"
by Ted Kowalski and Adrian Walker,
www.executable-english.com/Oil_Industry_Supply_Chain_by_Kowalski_and_Walker.pdf

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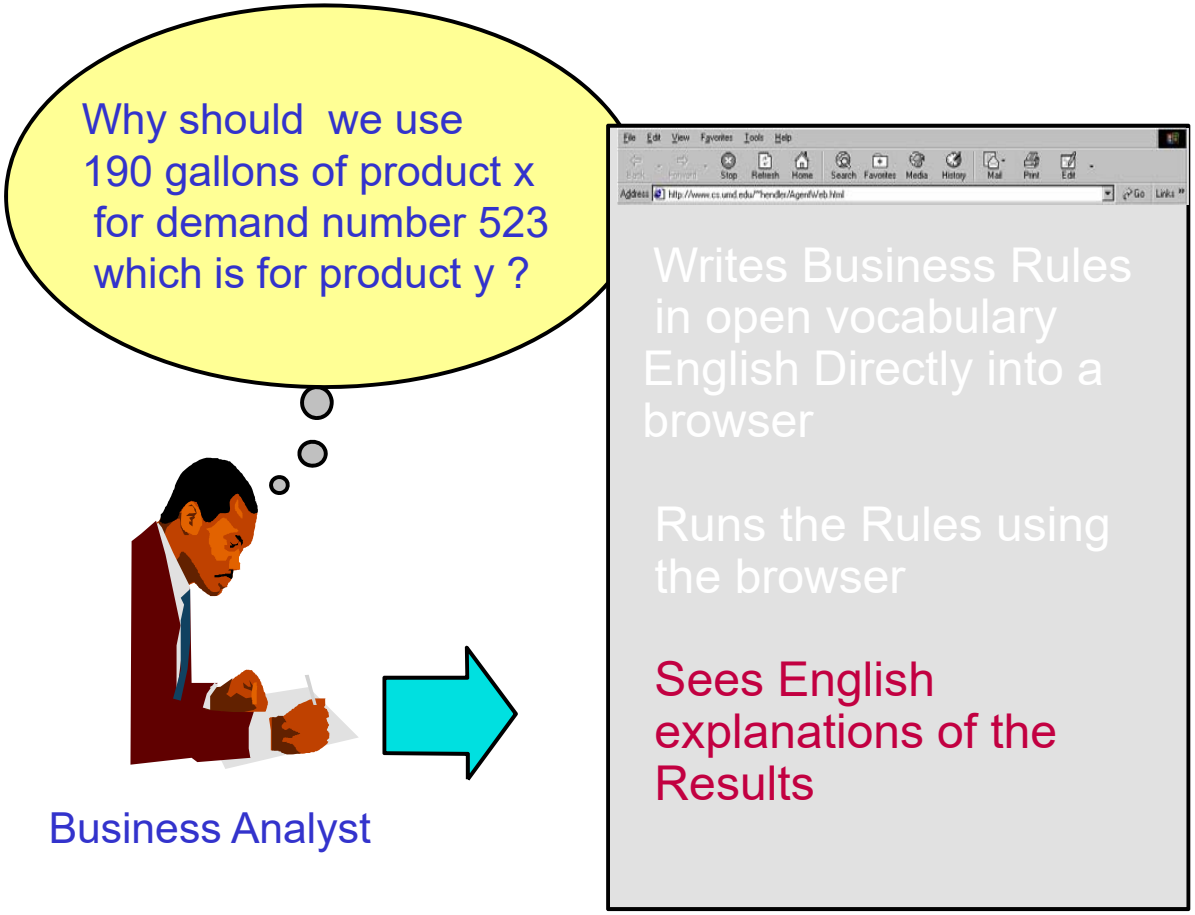
Supply Chain ---- oil industry ---- explanation:



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Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- explanation**:**

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005
for estimated demand 523 0.19 of the order will be product-x from Shell Canada One
1000 * 0.19 = 190
---
for demand 523 NJ for 1000 product-y we use 190 product-x from Shell Canada One

To view, run and change this example, please point a browser to executable-english.com and select Oil-IndustrySupplyChain1

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Supply Chain ---- oil industry ---- explanation**:**

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005
for estimated demand 523 0.19 of the order will be product-x from Shell Canada One
1000 * 0.19 = 190
---
for demand 523 NJ for 1000 product-y we use 190 product-x from Shell Canada One

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005
for demand 523 for product-y refinery Shell Canada One can supply 300 gallons of product-x
for demand 523 the refineries have altogether 1600 gallons of acceptable base products
300 / 1600 = 0.1875
0.1875 rounded to 2 places after the decimal point is 0.19
---
for estimated demand 523 0.19 of the order will be product-x from Shell Canada One

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Application Semantics via Next Generation Business Rules

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for estimated demand 523 0.19 of the order will be product-x from Shell Canada One
1000 * 0.19 = 190
---
for demand 523 NJ for 1000 product-y we use 190 product-x from Shell Canada One

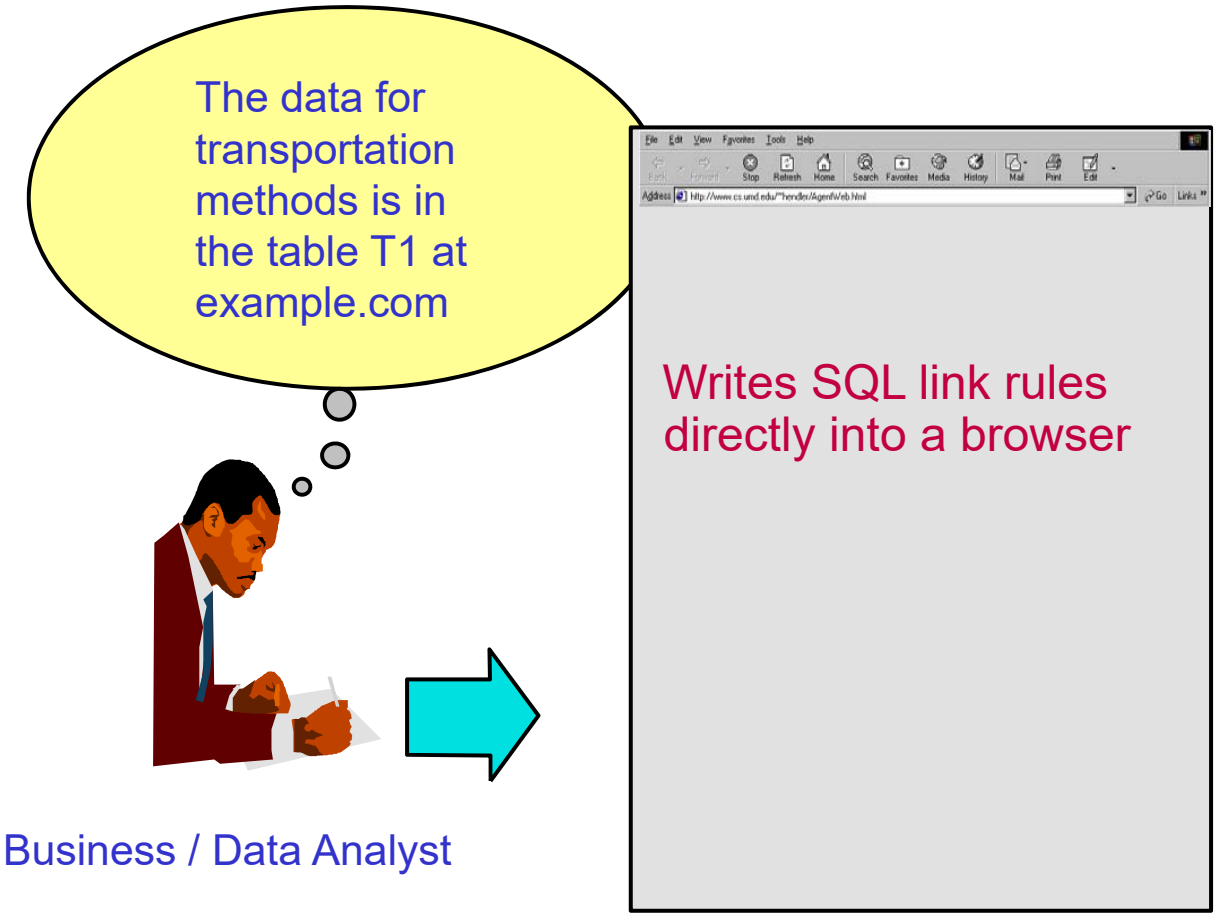
estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005
for demand 523 for product-y refinery Shell Canada One can supply 300 gallons of product-x
for demand 523 the refineries have altogether 1600 gallons of acceptable base products
300 / 1600 = 0.1875
0.1875 rounded to 2 places after the decimal point is 0.19
---
for estimated demand 523 0.19 of the order will be product-x from Shell Canada One

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005
sum eg-amount :
for demand 523 for product-y refinery eg-refinery can supply eg-amount gallons of eg-product1 = 1600
---
for demand 523 the refineries have altogether 1600 gallons of acceptable base products

To view, run and change this example, please point a browser to executable-english.com and select Oil-IndustrySupplyChain1

Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- automatic generation of complex SQL queries**:**



To view, run and change this example, please point a browser to executable-english.com and select Oil-IndustrySupplyChain1MySql1

Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- finding SQL data on the internet**:**

A data table

we have this-method transportation from refinery this-name to region this-region

truck	Shell Canada One	NJ
rail	Shell Canada One	NJ

A link rule that says how to find an equivalent table “T1” on the internet

url:example.com dbms:mysql dbname:transport tablename:T1 port:3306 id:id123 password:pw345

---

we have this-method transportation from refinery this-name to region this-region

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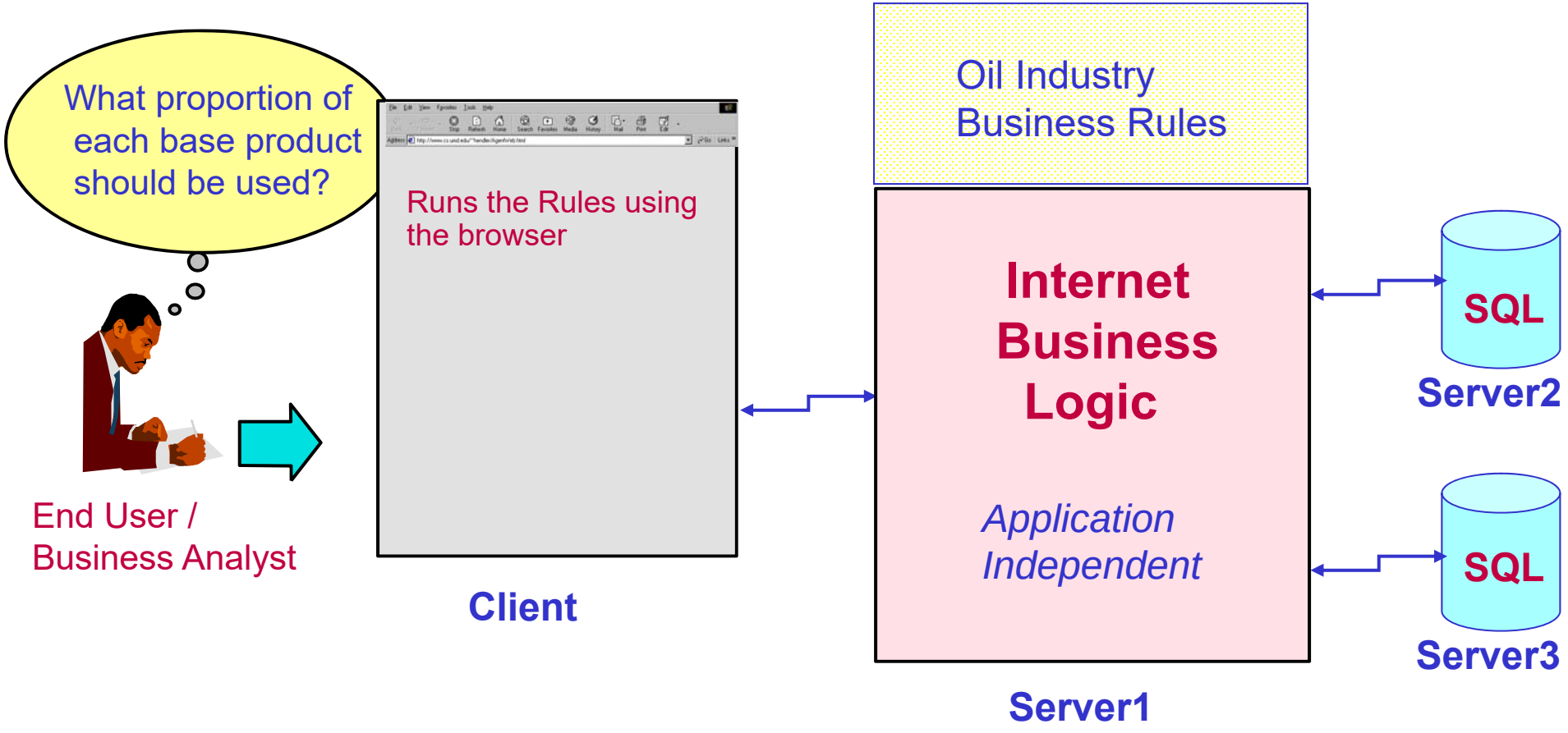

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Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- automatic generation of complex SQL queries :

```
select distinct x6,T2.PRODUCT,T1.NAME,T2.AMOUNT,x5 from
T6 tt1,T6 tt2,T5,T4,T3,T2,T1,T6,
(select x3 x6,T6.FINISHED_PRODUCT x7,T6.ID x8,tt1.ID x9,tt2.ID x10,sum(x4) x5 from
T6,T6 tt1,T6 tt2,
((select T6.ID x3,T3.PRODUCT1,T1.NAME,T2.AMOUNT x4,T2.PRODUCT from
T1,T2,T3,T4,T5,T6,T6 tt1,T6 tt2 where
T1.NAME=T2.NAME and T1.REGION=T6.REGION and T2.MONTH1=T4.MONTH1 and
T2.MONTH1=T6.MONTH1 and T2.PRODUCT=T3.PRODUCT2 and T4.MONTH1=T6.MONTH1 and
T3.PRODUCT1=T6.FINISHED_PRODUCT and T3.SEASON=T4.SEASON and T3.SEASON=T5.SEASON and
T4.SEASON=T5.SEASON and T6.ID=tt1.ID and T6.ID=tt2.ID and tt1.ID=tt2.ID)
union
(select T6.ID x3,T2.PRODUCT,T1.NAME,T2.AMOUNT x4,T2.PRODUCT from
T1,T2,T3,T4,T5,T6,T6 tt1,T6 tt2 where
T1.NAME=T2.NAME and T1.REGION=T6.REGION and T2.MONTH1=T6.MONTH1 and
T2.PRODUCT=T6.FINISHED_PRODUCT and T6.ID=tt1.ID and T6.ID=tt2.ID and tt1.ID=tt2.ID)
) group by T6.FINISHED_PRODUCT,T6.ID,tt1.ID,tt2.ID,x3) where
T6.ID=tt2.ID and tt1.ID=T6.ID and T6.FINISHED_PRODUCT=x7 and T6.ID=x8 and tt1.ID=x8 and
tt2.ID=x8 and T1.NAME=T2.NAME and T1.REGION=tt2.REGION and T2.MONTH1=T4.MONTH1 and
T2.MONTH1=tt2.MONTH1 and T2.PRODUCT=T3.PRODUCT2 and
T3.PRODUCT1=tt1.FINISHED_PRODUCT and T3.PRODUCT1=tt2.FINISHED_PRODUCT and
T3.SEASON=T4.SEASON and T3.SEASON=T5.SEASON and T4.MONTH1=tt2.MONTH1 and
T4.SEASON=T5.SEASON and T6.ID=x6 and tt1.FINISHED_PRODUCT=tt2.FINISHED_PRODUCT and
tt1.ID=tt2.ID and tt1.ID=x6 and tt2.ID=x6
order by x6,T2.PRODUCT,T1.NAME,T2.AMOUNT,x5;
```

Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- automatic generation of complex SQL queries **:**

- It would be difficult to
  - write the SQL query reliably by hand
  - manually reconcile it with the business knowledge specified in the rules.
- Yet this example is simpler than for a real supply chain !

- How do we know that the automatically generated SQL implements the business rules correctly ?
- Because we can still get step-by-step business level English explanations

Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- Automatic generation of complex SQL queries **:**

- Could a programmer write more readable SQL by hand ?

- Yes, but we would need to add comments in English to help people to reconcile the hand-written query with the business knowledge

- By their nature, the comments would not be used during machine processing
  -- correctness of the hand written-SQL would rely on lengthy, and error prone manual verification

- Comments are sometimes not kept up to date with the code!

Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

Google and Business rules in English

Search: for estimated demand that-id fraction of the order

Google and Business rules in English

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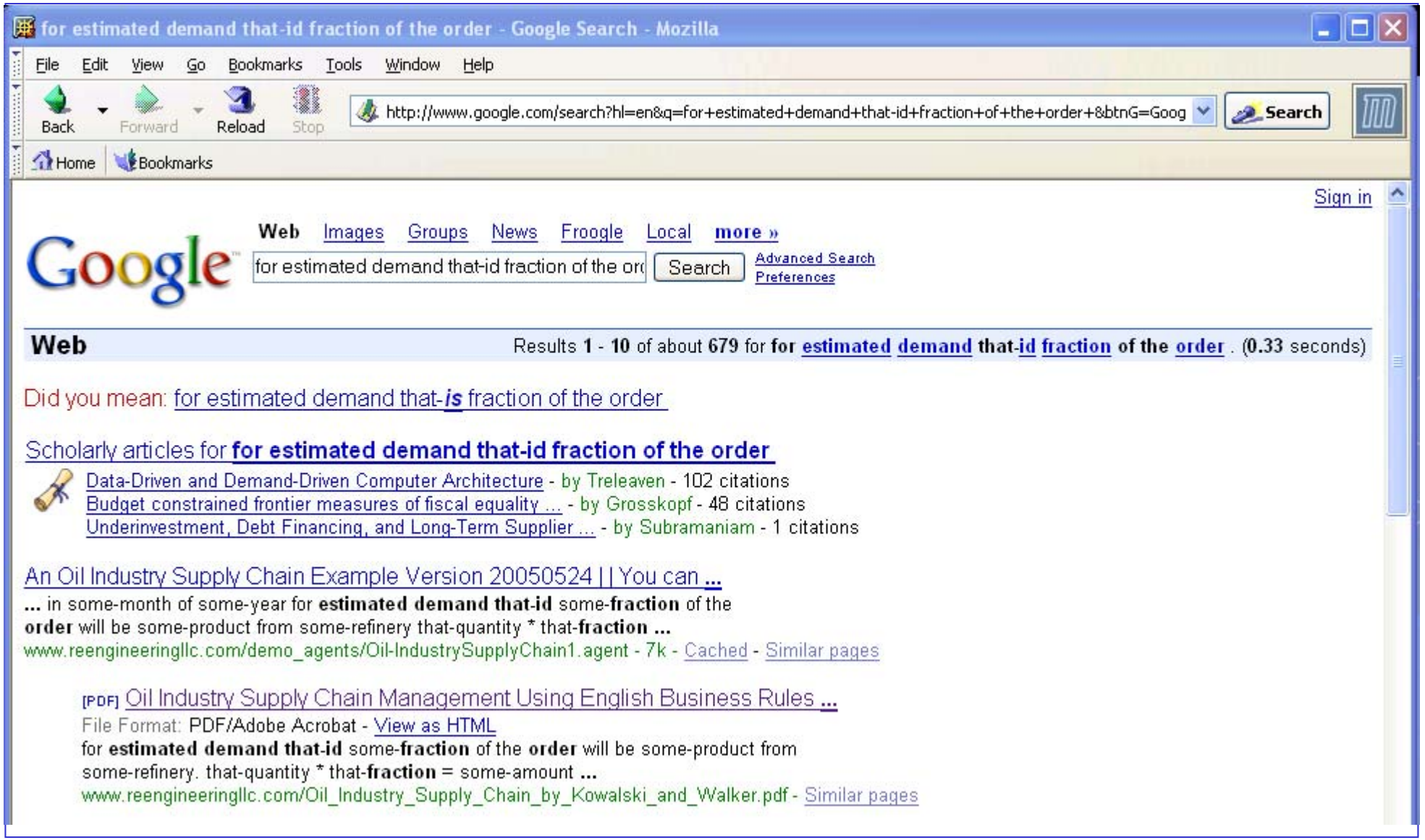

Google and Business rules in English

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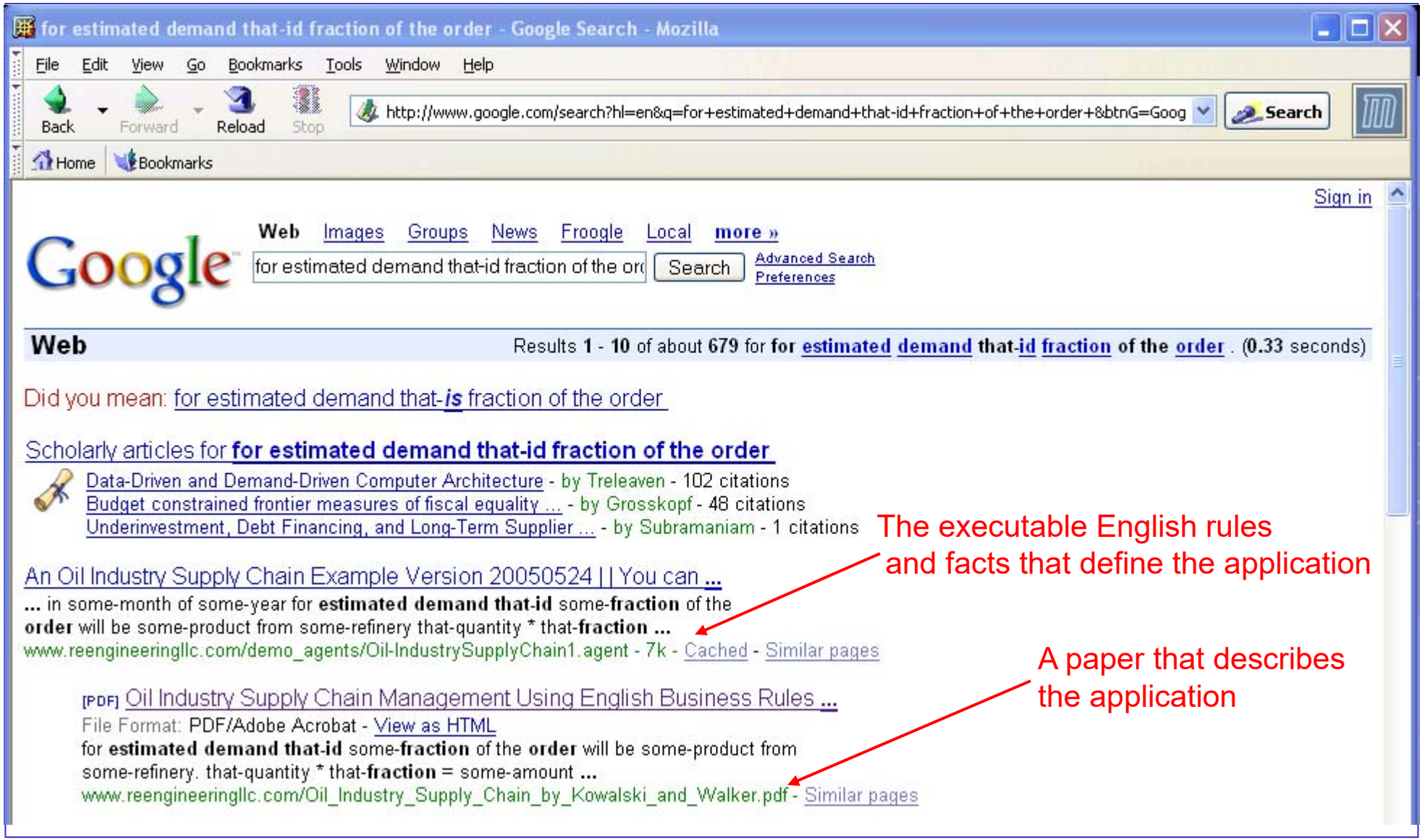

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Comparing Open Vocabulary English and OMG SBVR

IBL = Open Vocabulary English [executable-english.com]

Conceptually simple system that *internally* combines three kinds of semantics:

SBVR = Semantics of Business Vocabulary and Business Rules

A 390-page document specifying a design approach and a methodology [SBVR-06-03-02]

"unfortunately …. the material is rather difficult to approach"

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Conceptually simple system that *internally* combines three kinds of semantics:

Semantics1: "Data Semantics" as in a relational database, XML or RDF

Semantics2: specifies what a rule engine should do

Semantics3: Application Semantics -- the meaning of English concepts at the author- and user-interface

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Contributions from 19 industrial organizations, saying that information systems should comply with:

A logical formulation of Semantics

Common Logic

A business vocabulary

Structured English notation, with many keywords

Business rules -- rules that are under business jurisdiction

OMG XML and XMI for Meta Object Facility generation from vocabulary

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Common Logic -- compatibility problems with rules and relational databases

A business vocabulary

Structured English notation, with many keywords -- intensive dictionary & grammar maintenance

Business rules -- rules that are under business jurisdiction

OMG XML and XMI for Meta Object Facility generation from vocabulary

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Suggestion

Use parts of the SBVR approach, as needed, to get agreement among stakeholders

In parallel, write exploratory rules in the IBL, and run them over sample data

Then write for production purposes using the IBL or other rule system

Summary

- Importance of aligning IT and business -- Forrester
- Good things happen when we make smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google indexes and searches Business rules in English
- Comparison of Open Vocabulary English system and OMG SBVR specification

Links

1. These slides can be downloaded from www.executable-english.com

2. What a reasoner **should** do to be compatible with relational database usage:

   Backchain Iteration: Towards a Practical Inference Method that is Simple Enough to be Proved Terminating, Sound and Complete. Journal of Automated Reasoning, 11:1-22.

3. The English inferencing examples

   InsuranceCaseStudy1

   EU-rent2

   Medmine2

   Oil-IndustrySupplyChain1

   Oil-IndustrySupplyChain1MySql1

   (and many other examples provided) can be run, changed, and re-run as follows:

   1. Point Firefox or Chrome to www.executable-english.com
   2. Click on Internet Business Logic
   3. Click on the GO button
   4. Click on the Help button to see how to navigate through the pages
   5. Select InsuranceCaseStudy1

4. You are cordially invited to write and run your own examples. Shared use of the system is free.

About

- Author of over 20 papers, and an Addison-Wesley book,
  on business rule systems and databases

- Manager of Principles and Applications of Logic Programming,
  IBM Yorktown Research Laboratory

- Manager, Internet Development at Eventra
  (a manufacturing supply chain company)

- Assistant Professor at Rutgers University