Business Rules and Business Events

- where CEP Helps Decisions
Abstract

- Decision services are well-established as enforcers of decision rules in managed business applications. However, businesses can now use generic, event-driven decision services, both to identify important business events and to make the necessary required decisions. The techniques and tools to provide this are often classified as “Complex Event Processing” or CEP. CEP is subsequently being used increasingly in financial services, logistics, healthcare, telecommunications, energy, and defense applications. We look at the close relationship between events and business rules, using appropriate case studies. What You Will Learn:
  - How managed decisions are as relevant to event-driven systems as they are to batch-oriented or people-oriented systems
  - Where events fit in the realm of business rules
  - How businesses are event-driven, and how event-driven decisions match many business problems
Speaker: Paul Vincent, TIBCO Software CEP Group
- Co-author and contributor to rule standards (PRR, RIF... DMN)
- Co-chair EPTS RAWG
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Motivation: identify event processing (/EDA) as a
- Useful augmentation / alternative to the default BPM / SOA / decision service regime
- A closer mapping to the business rules mantra
- Set of useful business benefits (BAM, OI, ...) too!

Disclaimer/caveat: CEP technologies work alongside other (BPM, SOA, BRE) technologies...
Introduction - CEP

Pattern-Based Strategy Core Technologies

"Saved my 401K by identifying an economic pattern via the metric of counting railway trucks"

"Future of business rules is CEP"

"DM platform needs data preparation and decision refinement and also state ie combining with CEP ...

... Why not bring them together in active on / always on rule processing?"
Agenda

1. Business Rules (per BR Concepts, 3rd Ed)
2. Events vs Business Rules
3. Simple Event Processing
4. Complex Event Processing
5. CEP Architecture vs Business Rules
Business Rules 101

- Restrictions
- Guidelines
- Computations
- Inferences
- Timings
- Triggers

Can be combined:
when E occurs within time T, if X infer that Y must have Z with value f(Z) ...

e.g. X must have Y

e.g. X should have Y

= event dependencies
Business Rules 102

- Business Rules can be:
  - Restrictions
  - Guidelines
  - Computations
  - Inferences
  - Timings
  - Triggers

Business rules are defined through a business ontology: terms and facts.

Some facts may be events (state changes, observations, incidents) e.g.
- Flight arrivesAt Airport

Rules are enforced as events occur.

We want to predict when rules will get broken.
Events are key to business rule enforcement / evaluation

- Business rules drive process definitions
- Business rules drive decisions made in business processes
- Mapping from business rules to processes and decisions is easier from an event perspective

E.g. An Order over $1000 must not be accepted on credit without a credit check

- Change Rule Condition event
- Rule applies to "order" process...
- Change Limit (Rule Parameter) event
Events in business rule enforcement can be simple...

- **New Order event**
  - BPM: “order” process
  - BRMS: rule management process

- **Rule Change event**
  - Decision Service: process rules to enforce business rule
    - e.g. An Order over $1000 must not be accepted on credit without a credit check

Tight process-decision service development relationship

BPM: sequential activities especially useful for manual processing...
Events in business rule enforcement can also be complex

New fraud event (aggregated from other events)

BPM: “order” process

Decision Service: process rules to enforce business rule

E.g. An Order over $100 and with a fraud possibility > 45% must not be accepted without a customer identity check
But... Processes are just aggregating events too!

New Order event

New fraud event (aggregated from other events)

EP: “order” state

Event processing rules enforce business rules / decisions

e.g. Order (new? changed?) value $X and fraud possibility Y% can only be accepted with a customer identity check
But... Processes are just aggregating events (3)!

- New Order event
- New fraud event (aggregated from other events)

EP: “order” states: defined, accepted, fulfilled, changed, ...

Event processing rules enforce business rules / decisions + progress order state

State change in “order”

e.g. Order (new? changed?) value $X and fraud possibility $Y% can only be accepted with a customer identity check
But... Processes are just aggregating events (4)!

New Order event

New fraud event (aggregated from other events)

EP: “order” state
State set to “suspended”

New event changes fraud to 75% after Order accepted...

Event processing rules enforce business rules / decisions
+ advance order state
+ exceptions

e.g. An Order over $100 and with a fraud possibility > 45% without a customer identity check that has already been accepted then shipments must be suspended until the fraud possibility is reduced to below 5%
Why Use a CEP Platform for business rule automation?

Potential Business Value

- Business Event
- Resulting Complex Event Measured
- Root Cause / Correlation
- Corrective Decision Made
- Action Taken

- CEP provides quicker response to detected issues
- warnings precede threats
CEP Processing activity is automatic

1. Order event arrives over JMS / EMS or RV on a particular channel
2. Order event classified into appropriate class, stored in cache for future reference
3. Order state assessed and updated due to event details
4. Comparison rules run against order by rule engine, new information inferred
5. State transition rules executed to check for any state change due to new inferred data
6. If order can be completed, run SEC compliance rules

Event Cache  Other Data  Update & Track States  Reg Compliance check required?
Classification & filter  (Re)Assess Order vs other orders
Rulebase  State Model
Decisions are Event Driven

- Complex events require monitoring the simple events and decisions
  - Identify patterns
  - In real-time

- The decisions share events, data
  - Credit Card application patterns → Consumer Fraud possibility
  - All about Situation Awareness: business monitoring and insight

- So why keep the data in a separate system?
  - Traditional answer: too complex for IT to design and manage decisions and data models in the same system
  - Current solution: CEP technologies combine rules, events and real-time data stores to maximize performance
Example Architecture for Real-time Decisions

- Business Events drive business rule execution
- Rule maintenance & execution using BRE, BRMS features
- Real-time analytics using real-time rule monitoring + statistical functions / agents driving rule & score changes on-the-fly
- Operational event store provides event warehouse for real-time historic pattern detection

IT-friendly model-driven engineering via easy-to-understand state, query, rules, concepts, …

Champion Challenger thru multiple ruleset control / multiple decision agents
SOA vs EDA patterns for Decision Services

- Business Event
- Service Invoker Process
- Business Rule / Decision Engine
- Decision Result

- Business Event
- Event-driven Business Rule / Decision Engine
- Decision Result
SOA vs EDA patterns for Decision Services

Define Business Event

Define App Server / web service

Define Service / Ruleset orchestration

Define associated Rule

Define Decision Result

Define Business Event

Define associated Rule

Define Decision Event
Event and data patterns for Decision Services

Business Event

Service Invoker Process

Data Retrieve Process

Business Rule / Decision Engine

Decision Result

Data Store Process

Business Event

Event-driven Business Rule / Decision Engine

Data Grid Access

Decision Result
Decision Logic patterns for Decision Services

**Business Event**

- Pre-defined and ordered Decision Service invocations
- Data Retrieve Process
  - Business Rule / Decision Service 1
  - Business Rule / Decision Service 2
  - Decision Result
- Data Store Process

**Event-driven Business Rule / Decision Engine**

- Data Grid Access
  - Decision Result
High Scaleability patterns for Decision Services

Decision Service invoker

1. Data Retrieve Process
   - Business Rule / Decision Service 1
   - Decision Results
   - Business Rule / Decision Service 2
   - Decision Results

2. Data Grid Access
   - Event-driven Business Rule / Decision Agent
   - Event-driven Business Rule / Decision Agent
   - Decision Results
Business rules are used in CEP applications covering

- Sense & Respond
- Track & Trace
- Situation Awareness

Users should model events independent of infrastructure

- Flexibility / EDA vs Commonality / SOA

"We need to move from being process centric to more information centric"