Business Decisions from Real-Time Processing of Events

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TIBCO Software Inc.:
- Provides enterprise software that helps companies achieve service-oriented architecture (SOA) and business process management (BPM) success
  - Event distribution via high performance messages / message buses
  - Event processing for humans via BPM
  - Event processing for real-time operations and analytics
    - Complex Event Processing (CEP) product is TIBCO BusinessEvents
- Headquartered in Palo Alto, California
- Over 3,000 customers and offices in 40 countries
Our Problem

Ripped from the Headlines

IN THE EVENT WE ARE
GROUND FOR 10 HOURS,
JETBLUE WILL PROVIDE ...

LEHMAN BROTHERS
Business Need

Need to Know - in Real-Time
Must Quickly Discover and Manage Risks
Need IT Solutions to Support the Business, Faster
Fickle Customers - Lack of Loyalty
Continual Competitive Pressure to Differentiate
Hard to adopt new tools within the old IT infrastructure

But Business IT has its own Problems

Database-centric
Manual Processes, and Slow Decisioning
Rigid IT Infrastructure
Need Better Technical Capability to Help Meet SLAs
Need Faster Time-to-Market

Change Support Change
Big Problem for Both
Business is Event-Driven - IT systems are Not

Risk

Need systems that provide answers,
Not make you ask questions *

* Anyway, most of the time
we don’t know the right questions to ask

Big Problem for Both
Business is Event-Driven - IT systems are Not

- Enable responsiveness and
  match the velocity of business
- Smart and aware solutions
  that “learn” and “adjust” to
  circumstances

  e.g. Traffic lights that sense
  congestion and re-evaluate
  timing policies as required
Big Problem for Both
Business is Event-Driven - IT systems are Not

• Automating processes that previously could only be manually completed
• Opportunities can be identified and reacted to in a predictive way

Example: Event Driven
Provisioning

1. A delivery truck hits a deer and is unable to complete the scheduled deliveries.

2. There are at least two active delivery trucks ready in the same area within the last hour.

3. Solution: adjust, assign, then deliver to the customer on time automatically without manual processes.
Common Issues

Event driven – but never just a “single event”
some sort of event correlation is needed

Time is of prime importance
before the opportunity ends

Decisions and Actions are required
driven by policies, practices, and procedures
decisions are based on the combination of
prior knowledge and present context

But...

My company is like this...

Which is where
Complex Event Processing
(CEP) comes in.
The Solution

Business Events form an “event cloud”
Applying intelligence to the Event Cloud

Complex Event Processing – What Is It?

- Real Time Action / Reaction
- Finding Important Business Patterns
- Measuring Granular Events
- Event detection
- ID Theft Probability
- Customer Upsell Scenario
Goals of CEP Solutions

- **Meeting Strategic Goals**
- **Executive Needs**
- **Opportunities**

- **Information Technology Management**
- **Security Policy Goals**
- “bigger picture”
- **Service Assurance and Uptime**

- **Line of Business Management**
- **Meeting Business Goals**
- **Bigger Picture**
- **Making & Control**
- **Better Customer Service**

Applications of CEP

- **Adaptive Marketing – Sense & Respond**
  - Pattern: Capture opportunity with customer while ‘the window is open’.

- **Telco – Situation Awareness**
  - SLA (Service Assurance)
  - Real Time Service Offers and Analytics

- **Finance – Sense & Respond**
  - Fraud Detection
  - Track and Trace Trades/Deals/Settlements
  - Pre/Post trade exceptions

- **Logistics - Track & Trace**
  - Track Packages against a “Plan”. Infer package delays in a proactive manner. Alert customers.

- **Government – Situation Awareness**
  - Track and Analyze ‘patterns’ that were otherwise very difficult to detect

- **Dynamic Resource Scheduling – Sense and Respond**
  - Real Time Optimization of Resources against a “Plan”.
The Technology

Needed: the Event-Decision Architecture
Event Processing, 1940s style

- Colossus - [http://www.tnmoc.org/ColRbd.htm](http://www.tnmoc.org/ColRbd.htm)
- Searched for patterns in encrypted messages
- Hardware-based

Simple Event Processing: 1950s on

- Evolution of IT follows the simple event processing model: event at a time processing
Simple Event Processing: 1980s on

- Evolution of IT follows the simple event processing model: event at a time processing

Simple Event Processing: 1990s on
Onset of complex event processing models:

- Continuous correlations of events

Local Event Store

Class Model

Event Bus

Low Latency CEP

- In-Memory event and data store for maximum performance

High Performance CEP

Event Sources

Event Sinks

Rule-driven Event Processing: real-time decisions
State-driven Event Processing: decision lifecycles

Query-based Event Processing: set-based decisions

```sql
8 select t.symbol, avg(t.price)
9 from StockTick (policy: maintain last 25 seconds where symbol = "TIBX") t
10 group by t.symbol;
```
Distributed Event Processing: resilient scalable decisions

Scalable CEP
- Replicated CEP Agents for load-balancing and hot-standby

Managed Event Processing: controlled decisions

CEP Framework
Managed CEP
CEP Platform
Shared Low-Latency Data
- distributed event history
Data Grid
for Low Latency High Volumes information
Summary of CEP’s Benefits for Rules, Concepts, …

**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

Leading to: Operational Intelligence

Operations Intelligence Infrastructure

Complex Event Processing Network
We Interrupt This Presentation ...

The Proof
Elemental Links: Event Processing Readership Trends

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<th>2006</th>
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EDA White Paper - downloads by industry
courtesy Brenda Michelson,
Elemental Links
@ 4th EPTS mtg, Sep08

http://elementallinks.typepad.com/bmichelson/2006/02/eventdriven_arc.html
**Situation Awareness: Airline Operations**

**Sense & Respond: Commercial Banking**

Computer says....
No...
2009 Predictions

- CEP continues to push the boundaries for IT
  - Distributed Decision Engines
  - Event-enabled Decision Management Workflow

- CEP continues to gain more acceptance for real-time STP
  - CEP tools provide the new “best practices” – performance, decisions, persistence, reliability, model-driven, XTP, built-in-BAM, standards …
  - CEP growing 20-50% YOY

- Market consolidation continues
  - 2008 CEP acquisitions by IBM, Oracle
  - Compare the pure-play BRE acquisitions
CEP case studies at the TIBCO User Group 2008 included:

- Carphone Warehouse (UK)
- AllState (US)
- Citi (Asia)
- SWA (US)

Also

- TIBCO Service Performance Manager
- TIBCO Spotfire for SixSigma

More real-time decisioning case studies will be at:

http://tucon.tibco.com/

For CEP and rule technology updates see the TIBCO Complex Event Processing Blog

http://tibcoblogs.com/cep

THE END

END