Streaming Analytics with Software AG Apama in connection with Kafka

Dr. Martin Skorsky
Senior Research Manager
Software AG
Darmstadt

AGENDA

- Streaming Analytics with Apama
- Connecting Apama and Kafka
- Smart-Data Project iTESA
- Transforming Transports: Ports as Intelligent Logistic Hubs
- Customer References

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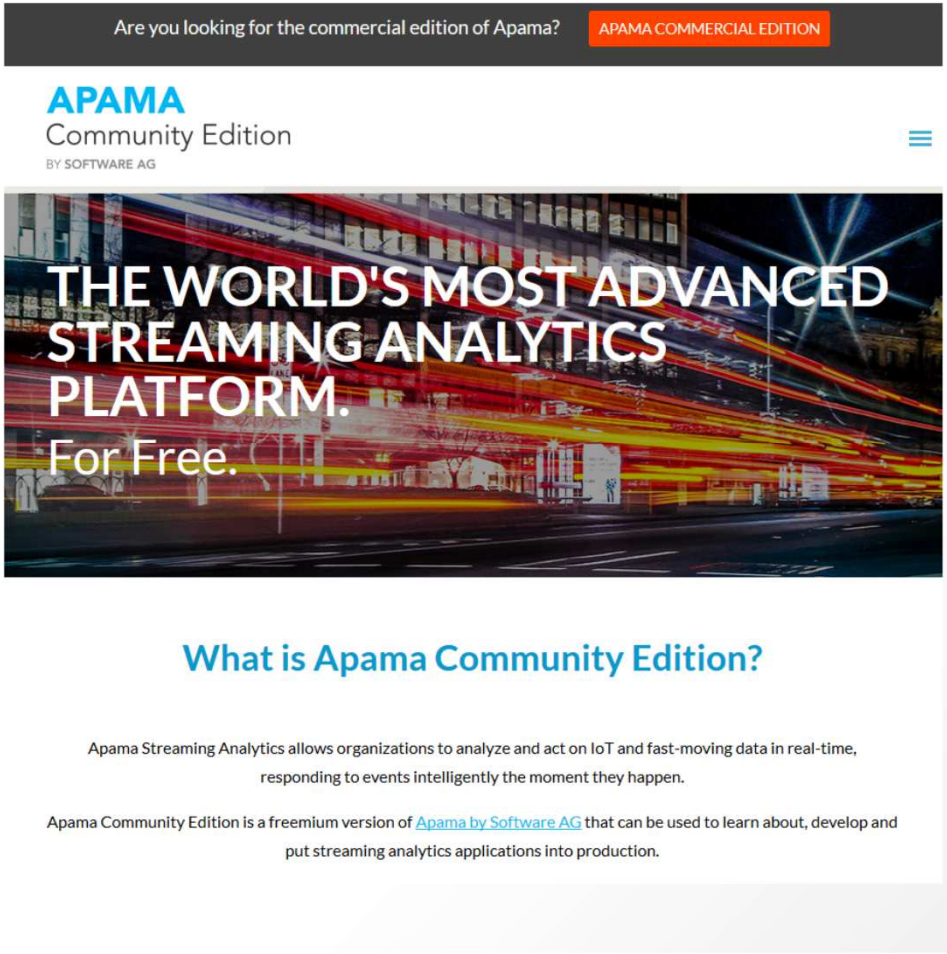
APAMA
STREAMING ANALYTICS

http://www.apamacommunity.com/



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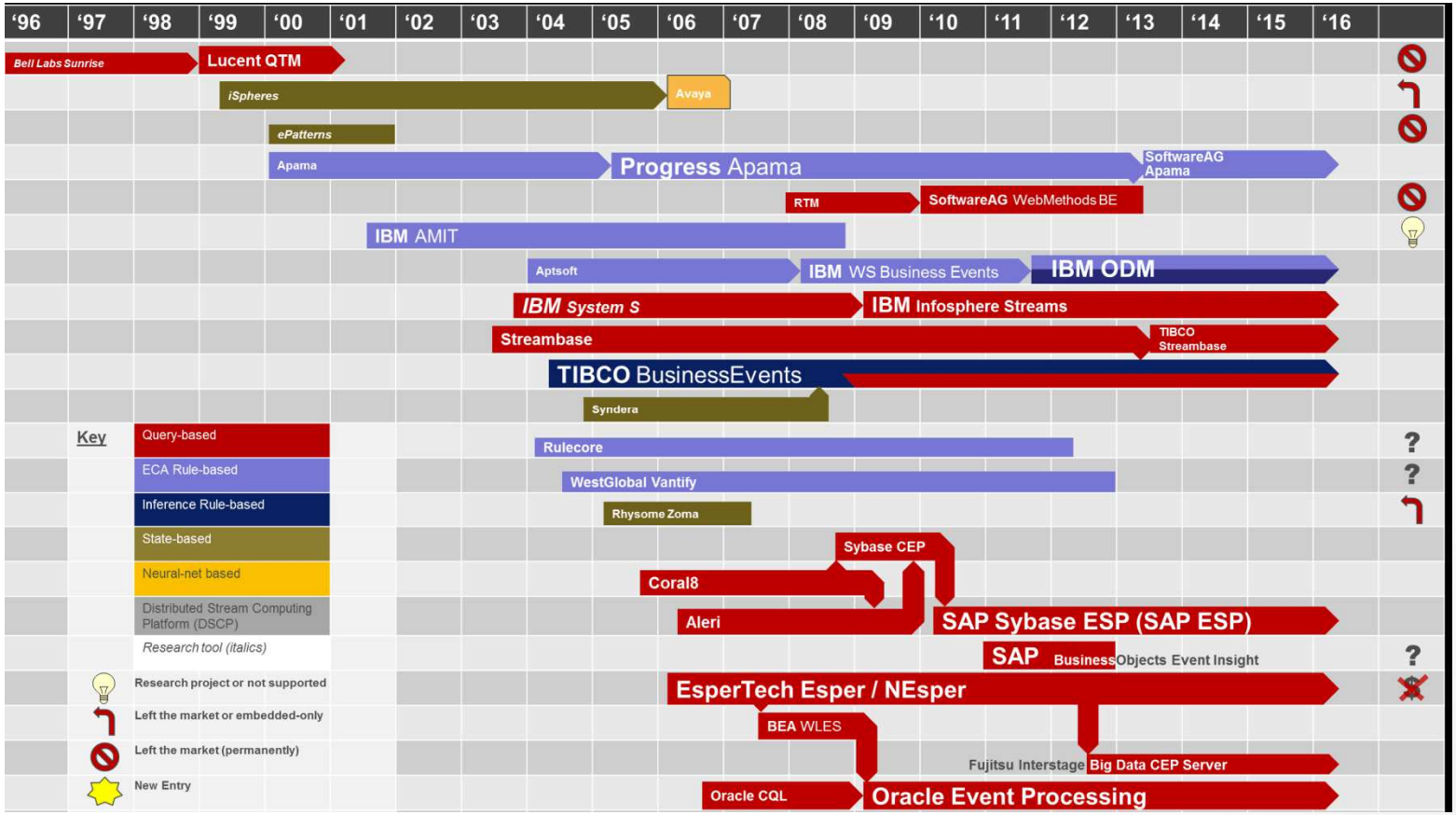
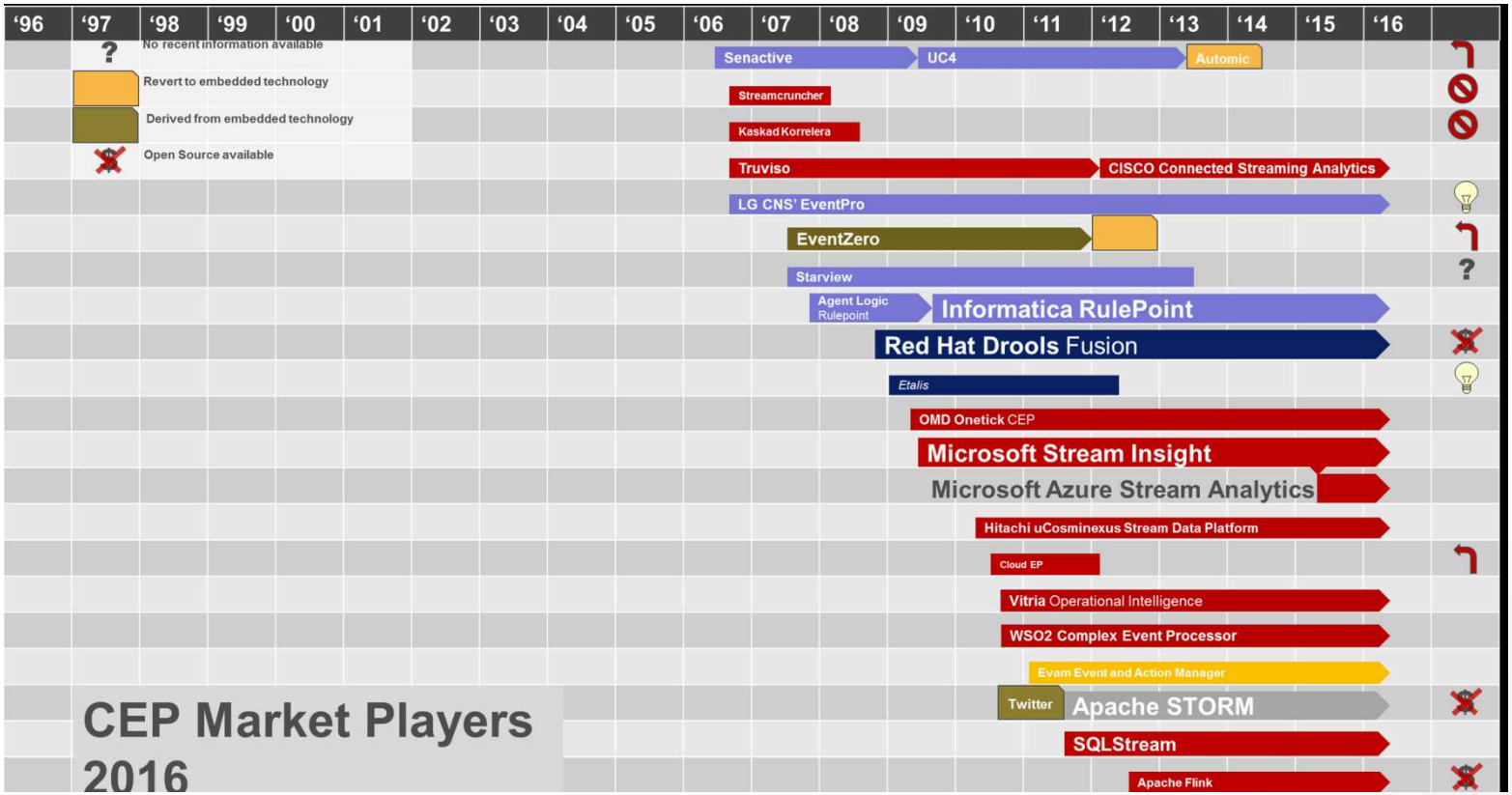
COMPLEX EVENT PROCESSING MARKET 2016



COMPLEX EVENT PROCESSING MARKET 2016



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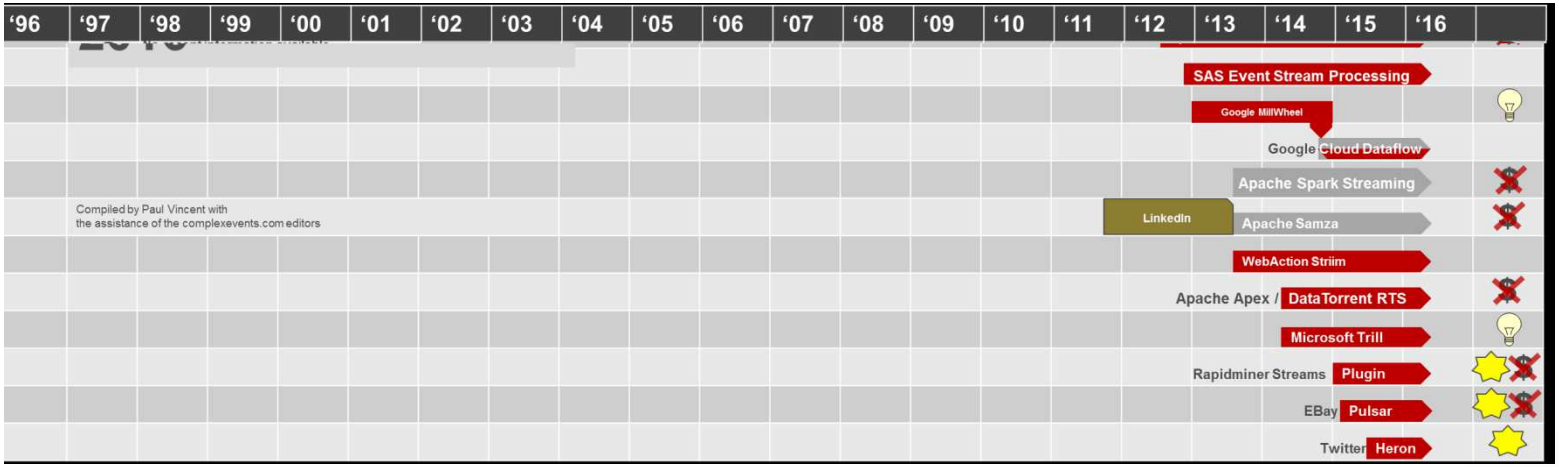
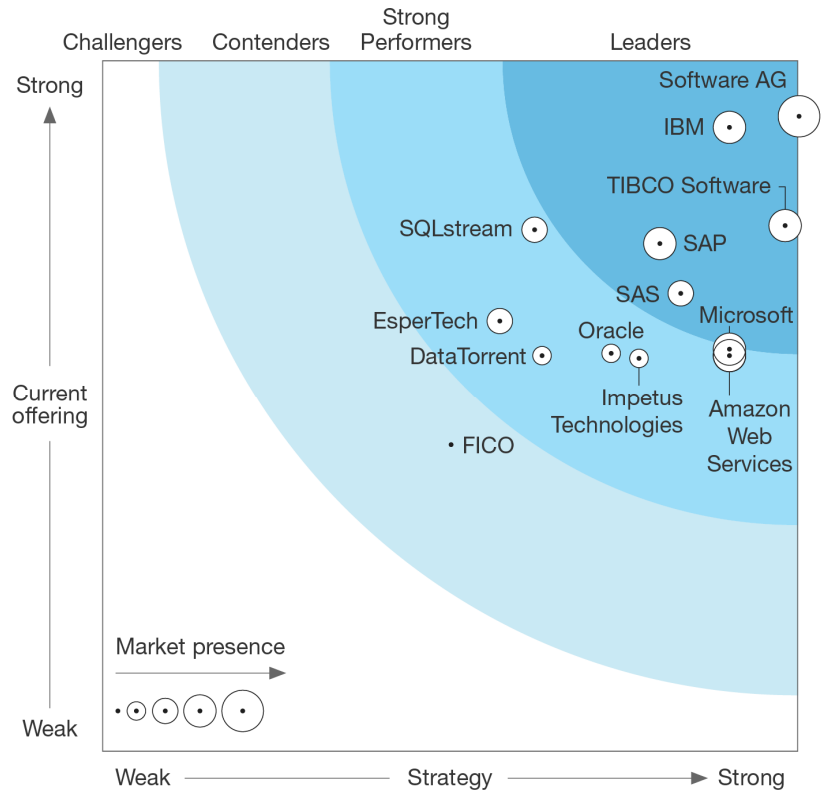


Source: http://www.complexevents.com/2016/05/12/cep-tooling-market-survey-2016/

SOFTWARE AG RANKED AS A LEADER

STREAMING ANALYTICS



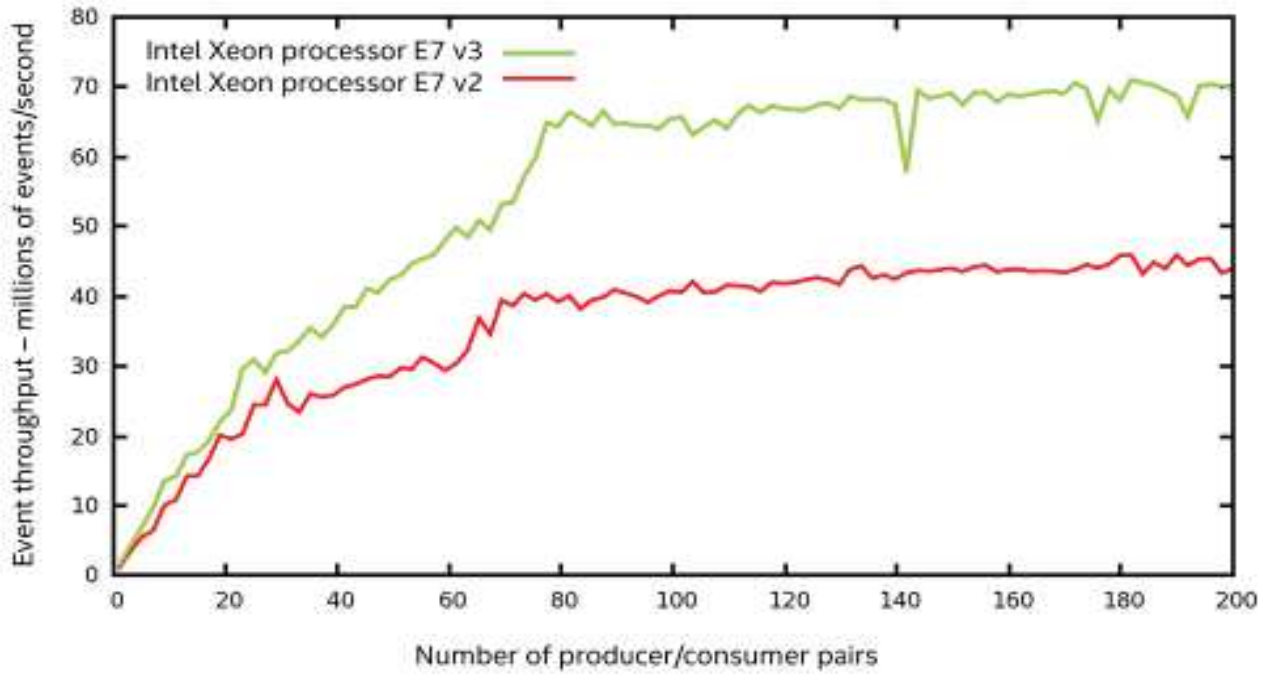
"Software AG's Apama continues to be a broadly applicable and perennially capable streaming analytics platform."

"With its recent acquisition of Cumulocity, Apama deeply extends its reach deeper into industrial IoT use cases by providing device management, digital twin, and other connectivity-oriented services."

"There is no stopping Apama to become the real-time engine for digital transformation that extends all the way from the factory floor to direct customer interactions."

Source: The Forrester Wave™: Streaming Analytics, Q3 2017, Forrester Research, Inc., September 7, 2017

APAMA: MASSIVE THROUGHPUT

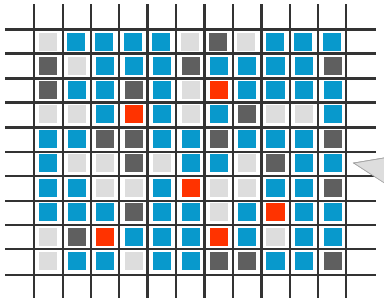


Hardware:

Intel Xeon processor family: 4 sockets, 18 cores per socket, Hyper-threaded, Xeon E7-8890 v3 CPUs

http://www.intel.com/content/dam/www/public/us/en/documents/white-papers/apama-analytics-xeon-e7-v3-paper.pdf

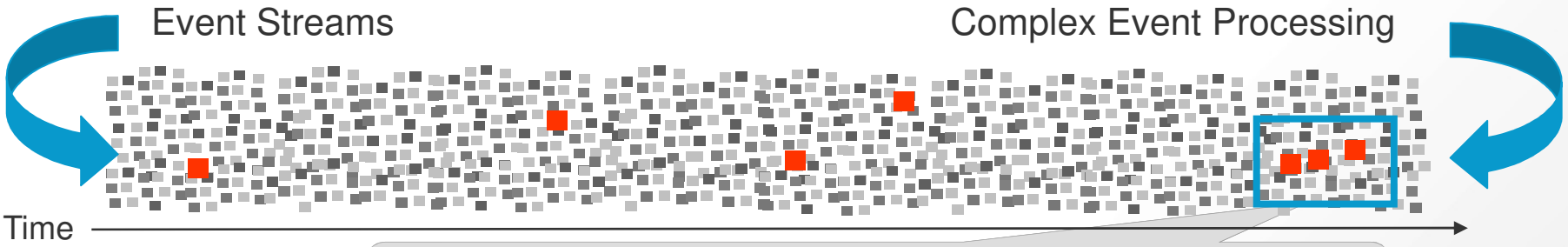
APAMA STREAMING ANALYTICS
BATCH PROCESSING VS. EVENT STREAM PROCESSING



Batch Processing:
"What was the average temperature of the machine yesterday?"

Data at Rest – Traditional Approach

- Store the data first
- Then analyze it (run queries)



Complex Event Processing: "When more than 3 temperature events are received above a threshold, alert."

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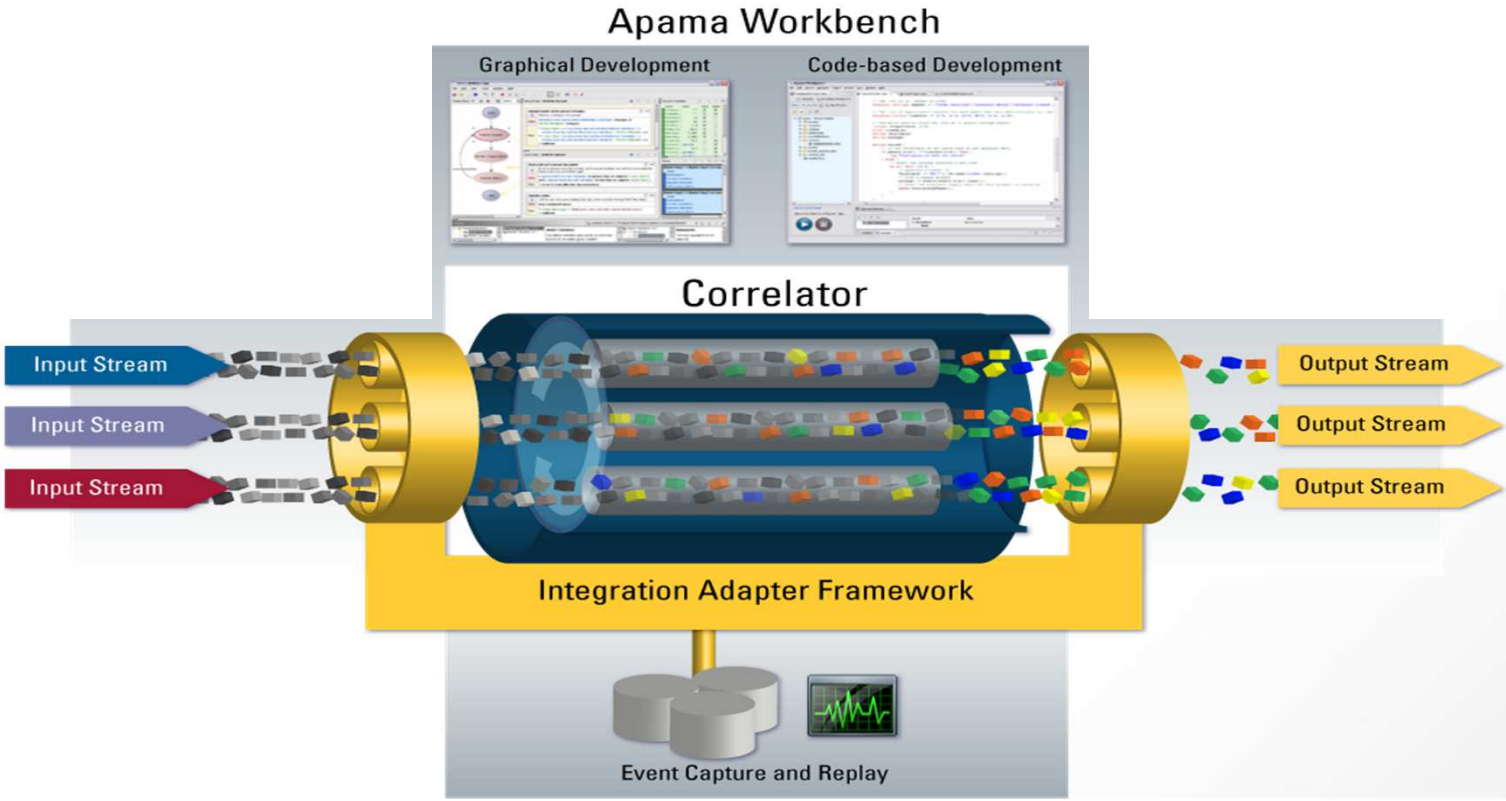
APAMA STREAMING ANALYTICS
THE APAMA CEP DEVELOPMENT PLATFORM



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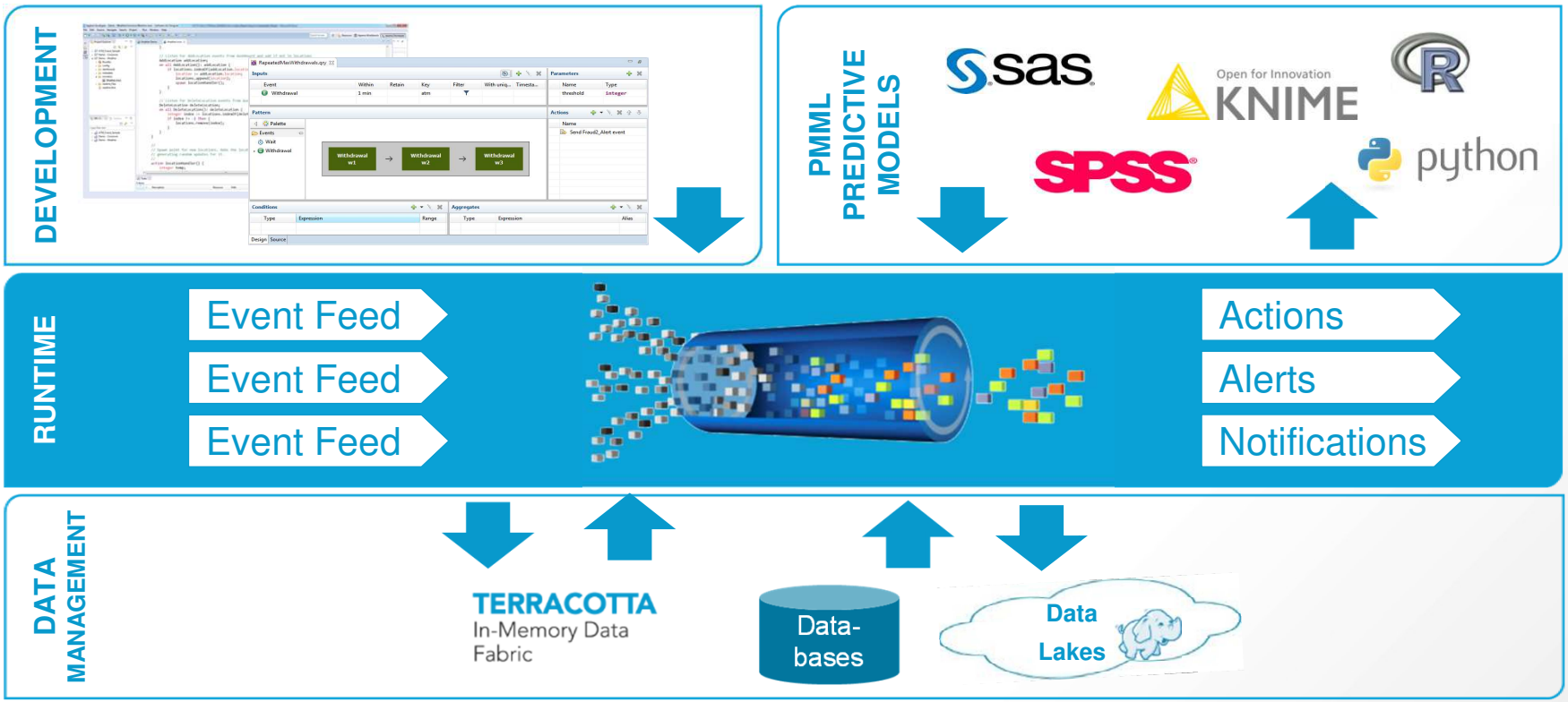
APAMA STREAMING ANALYTICS
DETECT PATTERNS AND ACT ON REAL-TIME INSIGHTS



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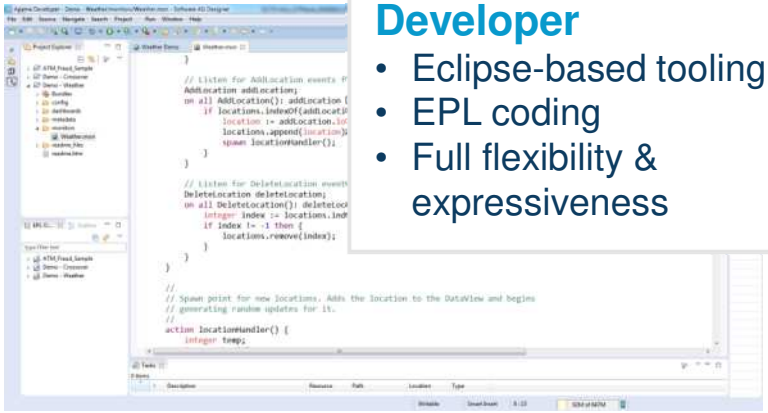
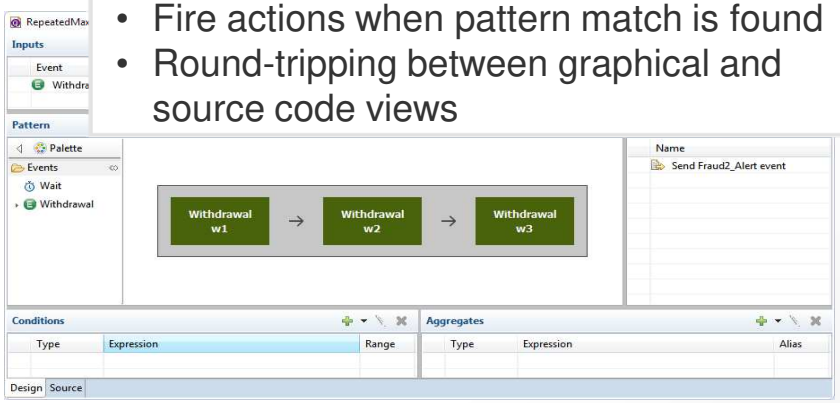
SOFTWARE AG - IOT PLATFORM SERVICES
IOT DEVELOPMENT **PERSONAS & TOOLING**



Developer
- Eclipse-based tooling
- EPL coding
- Full flexibility & expressiveness

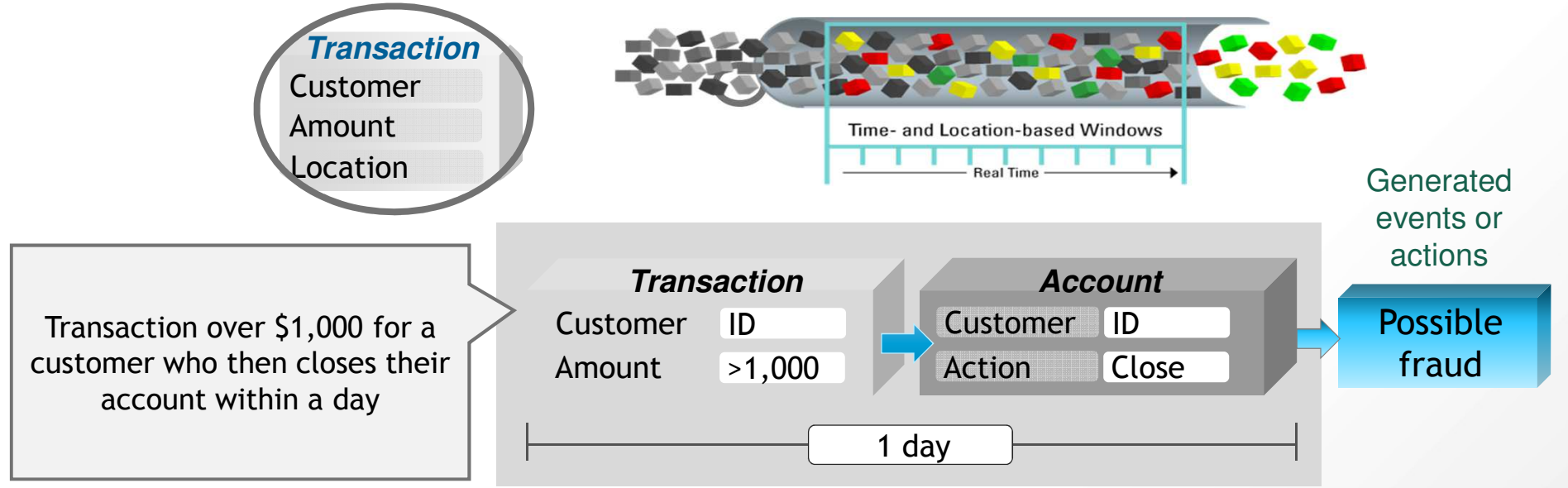
(Technical) Business Analyst
- Graphical modelling of declarative patterns across windows of data
- Fire actions when pattern match is found
- Round-tripping between graphical and source code views



Business User
- Web-based, wizard-driven graphical user interface
- Easy-to-use parameterization of existing templates

EXAMPLE 1: PATTERN MATCHING

- **Complex Event Processing** – Temporal, logical and spatial attributes and relationships between events can represent business patterns, including emerging opportunities & threats




```
on Transaction (customer = ID, amount > 1000) followed-by
   Account (customer = ID, Action = 'Close') within (1 * DAY)
```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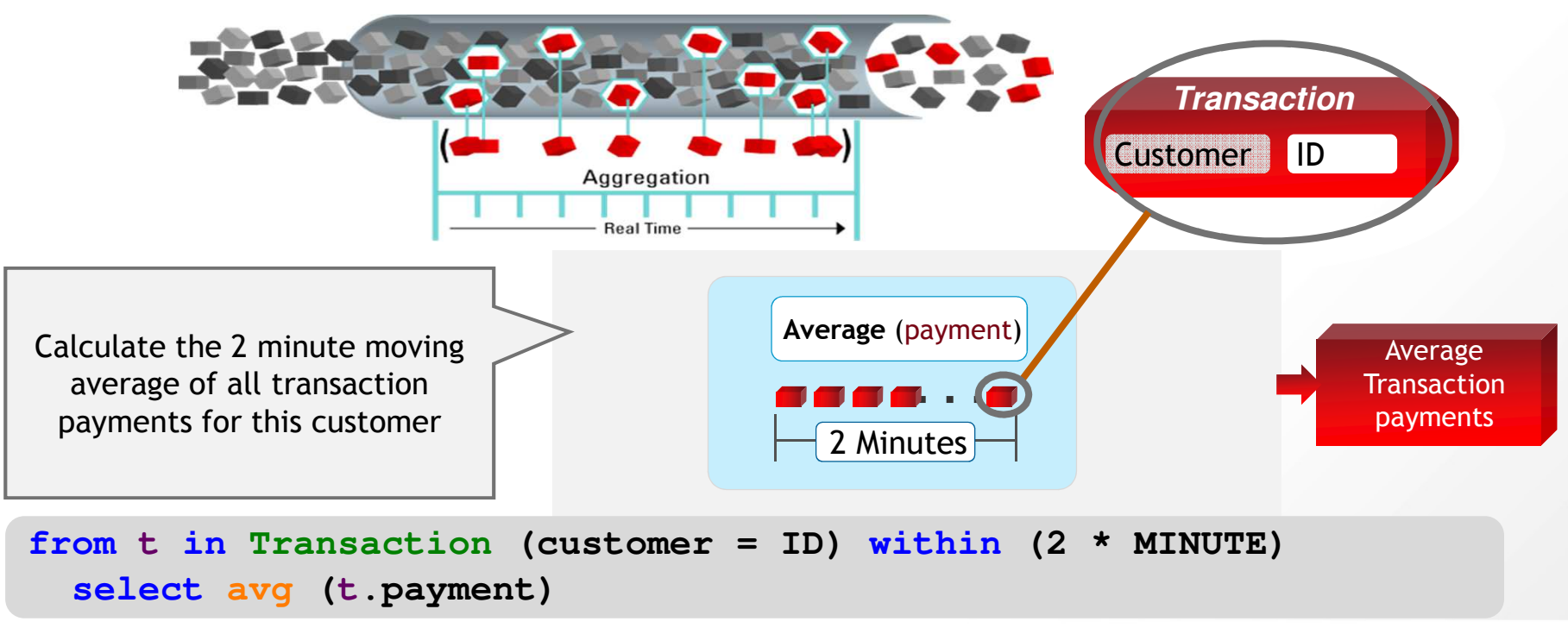
EXAMPLE 2: CONTINUOUS AGGREGATION

- **Streaming Analytics** – Continuous re-calculations on a continuously moving window of events matching a particular query




```
from t in Transaction (customer = ID) within (2 * MINUTE)
  select avg (t.payment)
```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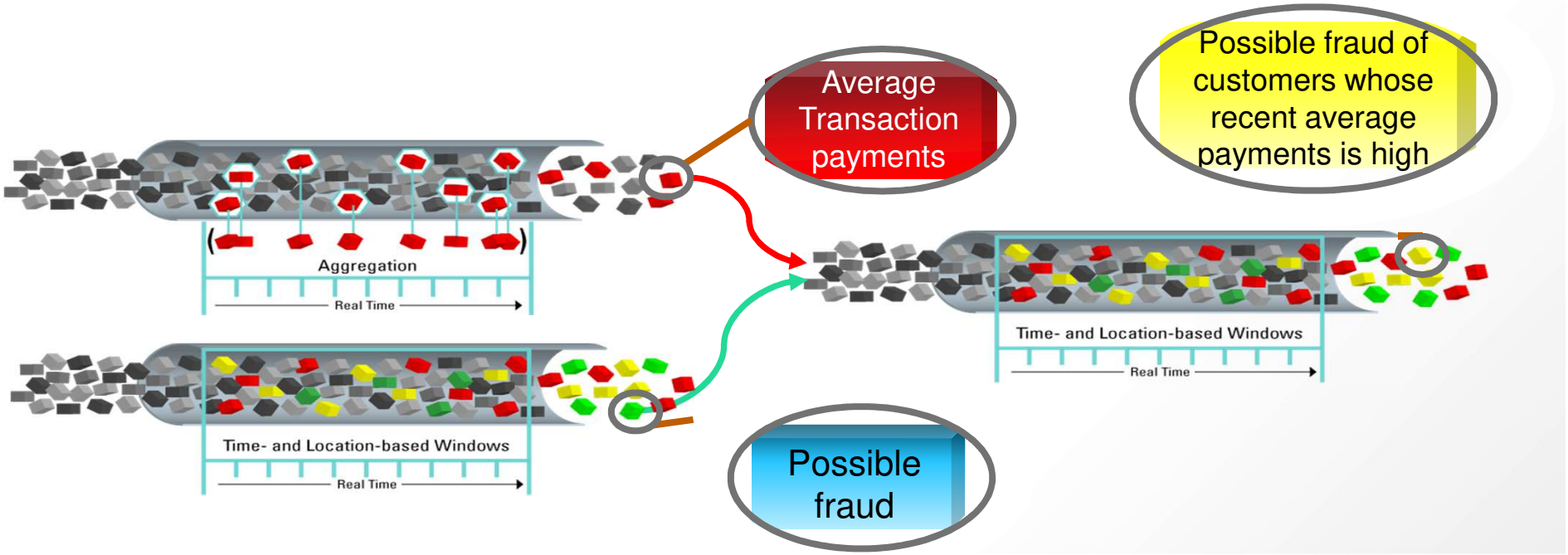
EXAMPLE 3: AGGREGATION

- **Dynamic Stream Networks** – Outputs from either Streaming Analytics or Complex Event Processing patterns can be fed into further streaming calculations or patterns.
  - The resultant network can changed dynamically: it need not be static



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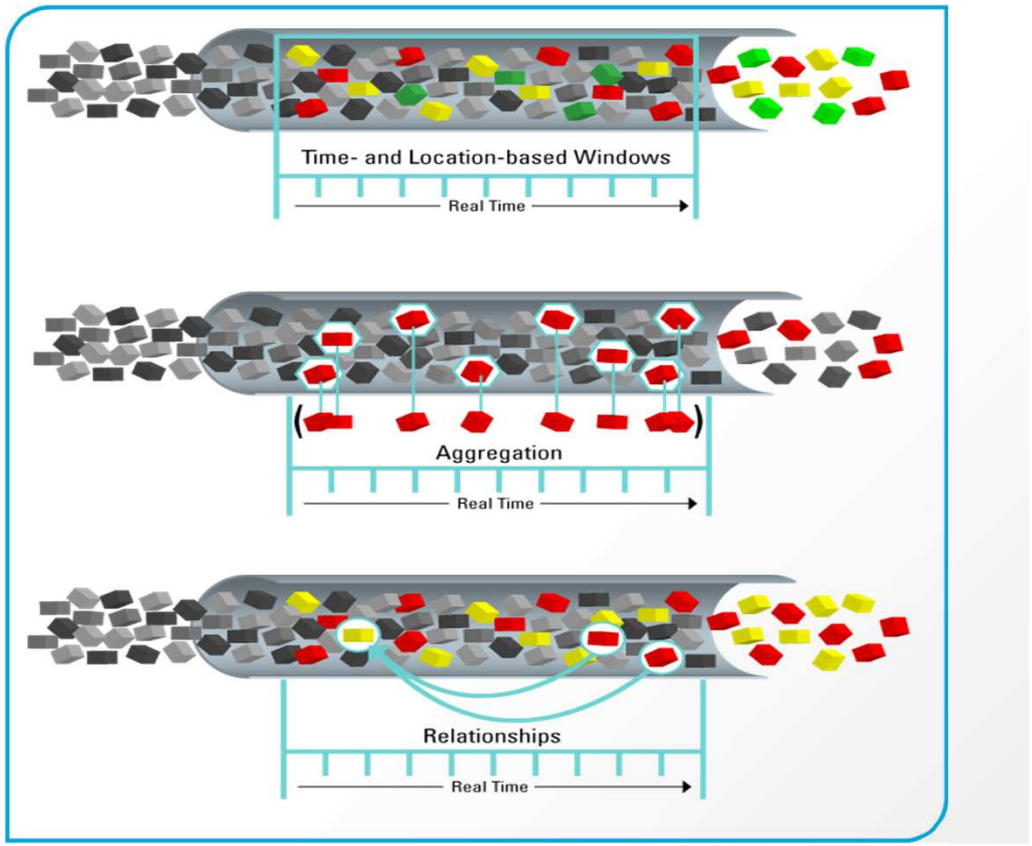
THE MOST TECHNICALLY COMPLETE, BUSINESS READY PLATFORM

- Time- and location-based windows
  - Within, near, etc. based in real-time context
- Grouping & Aggregation
  - Accumulation of values or quantity
  - Sum, average, min, max, etc.
  - Support for custom aggregate functions
- Event Relationships
  - Event A followed by event B
  - Event A and event B
  - Event A or event B
  - The non-event
- Event Enrichment
- User-defined Functions
- Flexibility and ease to mix models
- Rules can be templated and parameters updated dynamically



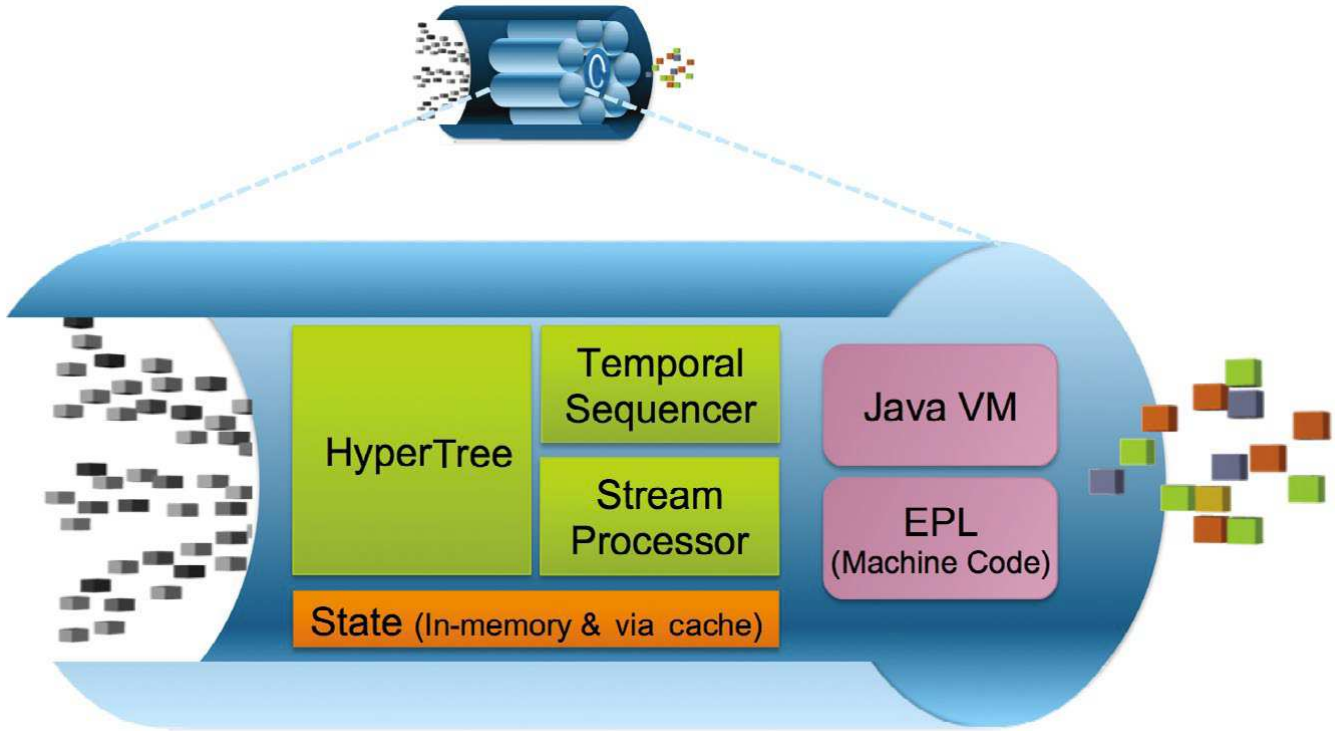
Apama Concepts

- Event Type
  - Describes an event with fields (attributes)
- Monitor
  - Unit of event processing code
- Listener
  - Listen for a specific type of events with filter conditions or a pattern of events
- Action
  - Procedure executed when a filter matches
- Stream
  - Sequence of events of the same type
- Channel
  - A named ‘pipe’ which can hold events of several event types
  - Examples: Input channel, Output channel

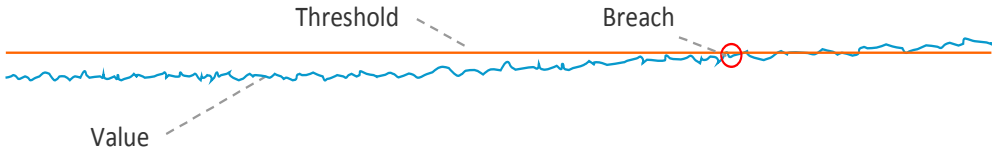
Apama – Example Event Processing Language

```
monitor PriceRise {
        StockTick firstTick;
        StockTick finalTick;
        action onload() {
                on StockTick (symbol="IBM", price > 210.54):firstTick {
                        furtherRise();
                }
        }
        action furtherRise() {
                on StockTick (symbol="IBM", price > firstTick.price * 1.05):finalTick {
                        hitLimit();
                }
        }
        action hitLimit() {
                log "IBM has hit " + finalTick.price.toString();
                send PlaceSellOrder ("IBM", 100.0) to "Market";
        }
}
```

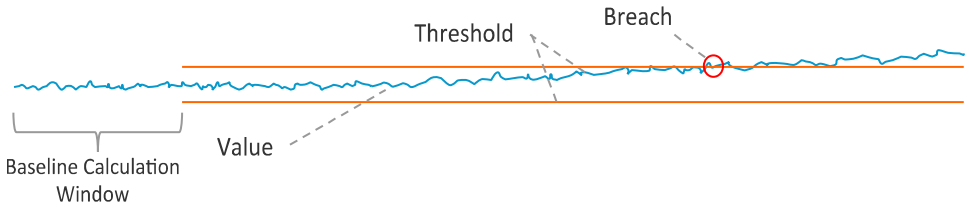

Apama Inside



EXAMPLE ANALYTICS WITH DEFINITIONS – ALL MULTIPLEX




```
Transform ("ThresholdBreach",
        ["SIMULATOR"],
        ["OUT"],
        {"threshold"     : "5.0",
         "direction"     : "rising",})
```




```
Transform ("BaselineThreshold",
        ["SIMULATOR"],
        ["OUT"],
           {"baseline"                : "25%",
            "baselinePeriod"          : "3600.0",})
```


```
Transform ("NominalRange",
        ["SIMULATOR"],
        ["OUT"],
           {"timeWindow"                          :
"10.0",
            "standardDeviationMultiple":
"2.0",})
```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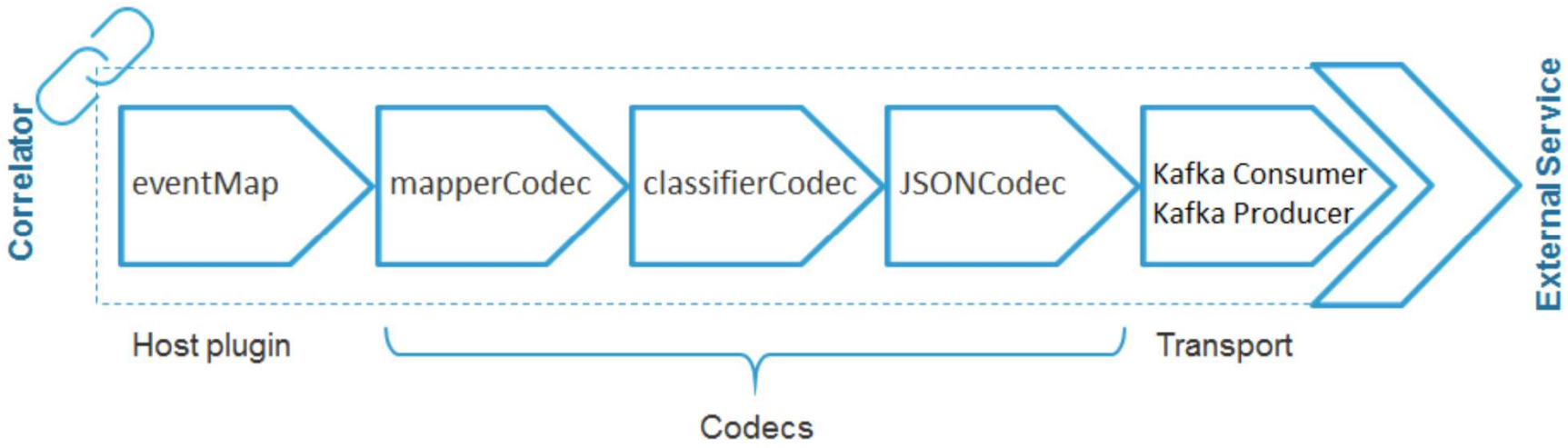
QUERY DEFINITION

```
query DetectRepeatedMaxWithdrawals {
        parameters {
                integer threshold;
        }

        inputs {
                Withdrawal(amount > threshold) key atm within 1 min;
        }

        find Withdrawal:w1 -> Withdrawal:w2 -> Withdrawal:w3 {
                %send("eventType":"apamax.querysamples.atmfraud.Fraud1_Alert",
                        "title":"Send Fraud2_Alert event", "description":"Send Fraud alert",
                                "channel":"\"apamax.querysamples.fraud_alerts\"",
                                "fields": {
                                        "message":"\"Potential fraud\"",
                                        "atmId":"atm.id",
                                        "w1":"w1",
                                        "w2":"w2",
                                        "w3":"w3"
                                });
        }
}
```


CONNECTING APAMA AND KAFKA
CONNECTIVITY CHAINS OF APAMA



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CONNECTING APAMA AND KAFKA
CONFIGURATION WITH YAML

```
plugins:
  JSONCodec:
    directory: ${APAMA_HOME}/lib/
    classpath:
        - json-codec.jar
    class: com.softwareag.connectivity.plugins.JSONCodec
  kafkaClient:
    directory: lib
    classpath:
      - kafka-transport.jar
      - kafka/kafka_2.12-0.10.2.1.jar
      - kafka/kafka-clients-0.10.2.1.jar
    class: com.softwareag.apama.kafka.Transport
  diagnosticCodec:
    libraryName: DiagnosticCodec
    class: DiagnosticCodec
```

```
kafkaService:
   - apama.eventMap:
      defaultEventType: com.softwareag.apama.KafkaMsg
   - JSONCodec
   - kafkaClient:
      consumer:
       servers:
        - "${consumer.servers}"
       topics:
        - "${consumer.topics}"
       client: "${consumer.client.id}"
      producer:
       servers:
        - "${producer.servers}"
       topic: "${producer.topic}"
       client: "${producer.client.id}"
```


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Mit Smart Data Reiserisiken aus dem Weg gehen

Öffentlich gefördertes Forschungsprojekt im Smart Data Programm

Smart Data

Gefördert durch: Bundesministerium für Wirtschaft und Energie aufgrund eines Beschlusses des Deutschen Bundestages

iTESA intelligent Traveller Early Situation Awareness

Ziel: Entwicklung eines automatisierten Echtzeit-Warnsystems für Reisende

travelbasys

Experten im Reisemarkt
Konsortialführer
Plattformanbieter

ULD Unabhängiges Landeszentrum für Datenschutz Schleswig-Holstein

Privacy-by-Design
Beratung
Datenschutz und
Datensicherheit

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Technologieanbieter
APAMA, TERRACOTTA

Fraunhofer IVI

Forschungseinrichtung:
Dynamisches Semantisches
Data Mining und Fuzzy
Association Rule Mining

INQUENCE

IT Spezialist für
Web Crawling &
Informationsermittlung

ITESA USES APAMA AND KAFKA

- Kafka and Flink are used at Fraunhofer IVI (Dresden) to compute risk data
- Connection from Kafka to Apama at Software AG
- Apama analyses risk data

- Apama analyses anomalies in social media data
- Sends these anomalies to Kafka for semantic analysis

TRANSFORMING TRANSPORTS

- European project for several logistic domains
  - Trains, ports, airports and more
- A sub-project:
  - Ports as Intelligent Logistics Hubs, here duisport
- Project uses SDIL infrastructure

DOMAIN PORTS: DUISPORT

Partners

- **duisport AG**
- **paluno - The Ruhr Institute for Software Technology, Universität Duisburg-Essen**
- **Software AG**

3.7 Million TEUs in 2016
400 container handling units

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WHAT IS THE GOAL AT DUISPORT?

1. Web-based Productivity Cockpit at Terminal and Port level for better decision-making
2. Introduce Predictive Maintenance approaches

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INTERNET OF THINGS (IOT)
CAR INSURANCE TELEMATICS

OCTO

Use Case

OCTO is building a new, **scalable platform telematics monitoring platform** to deal with 15M cars and to equip it to **enter new markets**, replacing a bespoke, home-grown platform.

Partner: Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

Digital Business Platform products being used:

- Apama, Aris, Terracotta, Universal Messaging, webMethods

Customer

OCTO – Italian headquartered leading global insurance telematics provider

Main offices:

- Rome-London-Boston

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DRIVING DIGITAL TRANSFORMATION
IN THE INSURANCE INDUSTRY

World-Leading Telematics Company

OPPORTUNITY:

- Transform data from 15 million cars into real-time insights and information
- Capitalize on increasing demand for real-time information while supporting growth and new opportunities
- Co-innovate with a strategic partner to maximize the value of device management, edge analytics, big data architectures, disaster recovery, business analyst tooling and cloud deployment

RESULTS:

- Improved customer experiences and enabled new propositions through real-time analysis of high-volume data
- Easily enabled new growth in new markets by governing a public API
- Optimized IT costs and value through full visibility and governance of resources

SINCE PARTNERING WITH SOFTWARE AG:

DRIVING UP

CUSTOMER SATISFACTION

HELPS INSURERS

DELIVER NEW PERSONALISED INSURANCE SOLUTIONS

REAL-TIME ANALYSIS

OF IOT DATA STREAMS REAL TIME CRASH DETECTION

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INCREASED PRODUCTION QUALITY
THROUGH APAMA STREAMING ANALYTICS

OPPORTUNITY:

- Find a toolset to design and implement a quality management solution across the entire factory
- Gain a greater level of awareness of production operations in real time

RESULTS:

- Improved quality management
- Faster response to production issues
- Flawless, uninterrupted copper production process
- Increased margins

SINCE PARTNERING WITH SOFTWARE AG:

PRODUCING **51.000.000 KM** OF **COILED COPPER WIRE** A YEAR
THAT'S FROM HERE TO MARS

Increasing Quality **Measurements**
from every **100 M** to every **25 MM**

GETTING SMART WITH LOGISTICS
THROUGH STREAMING ANALYTICS

KONINKLIJKE
ROYAL DIRKZWAGER
DIRKZWAGER

OPPORTUNITY:

- Respond faster to client requests
- Grow client demand for faster, more reliable data
- Expand ship location services for clients

RESULTS :

- More effective client decision-making
- Cost savings and strategic differentiation through rapid development of innovative service offerings
- Ability to gather full shipping movement details and relate them to clients in real-time
- Millions of dollars in savings delivered to clients from fuel cost reductions

SINCE PARTNERING WITH SOFTWARE AG:

200.000 SHIP MOVEMENTS TRACKED IN REAL TIME

INCREASED ACCURACY IN REPORTING ESTIMATED ARRIVAL TIME OF SHIPS

REDUCTION IN FUEL COST

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Links and Sources

- Apama Community (free download of Apama):
  - http://www.apamacommunity.com/
- White paper on technical aspects of Apama
  - https://www.softwareag.com/corporate/images/SAG_The_Apama_Platform_20PG_WP_Nov16_web_tcm16-113796.pdf
- Video “My First Apama Application” on YouTube
  - https://www.youtube.com/watch?v=sUxTqsjof68
- iTESA Project, travelling risk detection
  - http://smart-data-itesa.com/
- Transforming Transport
  - http://www.transformingtransport.eu/

Links and Sources

- Customer references
  - https://resources.softwareag.com/customers
- “OCTO Telematics: Building the world’s most innovative IoT platform for insurance”
  Telematics services in insurance companies and automotive companies
  - https://www.youtube.com/watch?v=VfxuvsPuKKM
  - Gartner Report: https://www.gartner.com/doc/reprints?id=1-4FNPQID&ct=170929&st=sb
- Quality control in copper wire manufacturing
  - http://www.apamacommunity.com/using-apama/schwering-hasse/
- Services for ships / Port of Rotterdam
  - http://www.apamacommunity.com/using-apama/royal-dirkzwager/

Links and Sources

- Complex Event Processing Market:
  - http://www.complexevents.com/2016/05/12/cep-tooling-market-survey-2016/
- Complex Event Processing Books
  - http://astore.amazon.com/compevenproc-20
  - The Power of Events: An Introduction to Complex Event Processing in Distributed Enterprise Systems, by David Luckham: http://astore.amazon.com/compevenproc-20/detail/0201727897
  - Thingalytics - Smart Big Data Analytics for the Internet of Things, by Dr. John Bates: http://astore.amazon.com/compevenproc-20/detail/0989756424
  - Event Processing in Action, by Opher Etzion, Peter Niblett: http://astore.amazon.com/compevenproc-20/detail/1935182218
  - Distributed Event-Based Systems, by Gero Mühl, Ludger Fiege, Peter Pietzuch: http://astore.amazon.com/compevenproc-20/detail/3540326510