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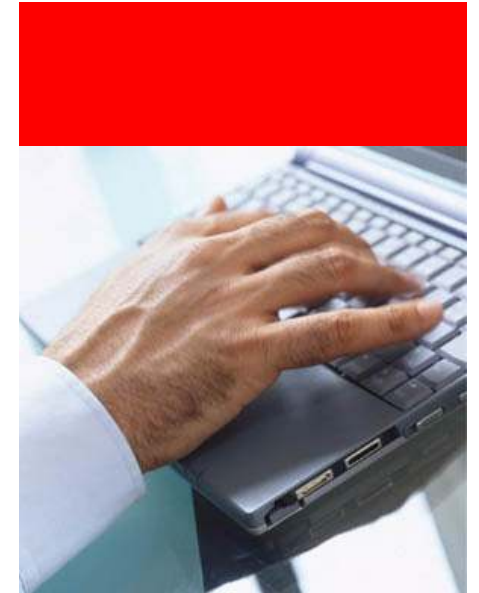
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Event-Driven SOA: Real-Time Situational Awareness Solutions Harnessing the Power of EDA

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Clemens Utschig-Utschig, Senior Principal Product Manager

Session **Agenda**

- Event-Driven SOA
- Patterns of Implementation
- Demonstration
- Oracle Event-Driven Architecture
- Questions & Answers



Event-Driven Applications



Financial Services:
Algorithmic trading



Transportation & Logistics:
Asset management

Telecommunications:
Distributed order orchestration



Manufacturing:
'Negative Working Capital' inventory management



Defense:

- Intrusion detection systems
- Military asset allocation



Insurance:
Reponses to calamities – earthquake, flooding



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Oracle Restricted and

Event-Driven Architecture Customers

Select Customer List

Finance/ Banking



Telecom



High Tech



Travel/ Transport



Public Sector



Other



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Business Impact of Events, BAM

Meaningful, Event-driven Intelligence for End-Users

➤ **Monitor** business processes & services in real-time

- Key Performance Indicators (KPIs)
- Service-Level Agreements (SLAs)

➤ **Analyze** events as they occur


- Correlate events & KPIs
- Identify trends as they emerge
- Alert users to bottlenecks & solutions

➤ **Act** on current conditions

- Event-driven alerts
- Real-time dashboards
- BPEL processes & web services integration



Event Processing



BA	BOEING	D	77.575	800	20080305 10:03:02.78
DD	DUPONT	D	41.575	3000	20080305 10:03:04.12
AA	ALCOA INC	D	20.125	1000	20080305 10:03:01.55
AXP	AMER EXPRESS CO	D	45.875	500	20080305 10:03:02.10
BA	BOEING	D	77.575	800	20080305 10:03:02.78
C	CTRGROUP	D	34.125	2000	20080305 10:03:03.05
CAT	CATERPILLAR	D	22.5	600	20080305 10:03:03.46
DD	DUPONT	D	41.575	3000	20080305 10:03:04.12
AA	ALCOA INC	D	20.125	1000	20080305 10:03:01.55
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Streams

- Continuous input, often in high-volume
- Time ordered
- Does not end
- *Impossible to process / analyze in real-time with traditional relational database systems*

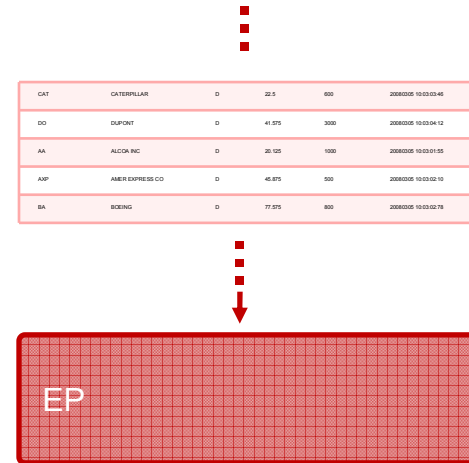
Event Processing provides a new data management infrastructure to support and analyze Streams in real-time

Oracle Event Processing

In-Memory, Continuous Queries

➤ Event Processing Output

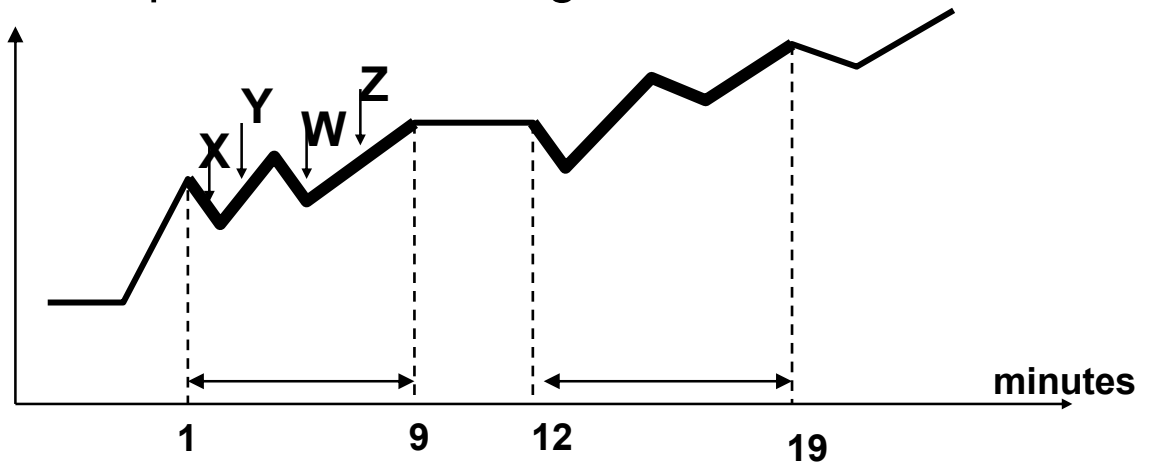
- Filtering
 - New stream filtered for specific criteria, e.g. stock price > \$22
- Correlation & Aggregation
 - Scrolling, time-based window metrics, e.g. average # of stock trades in the last hour
- Pattern Matching
 - Notification of detected event patterns, e.g. price changes A, B and C occurred within 15 minute window



Runs In-Memory (not in Database)

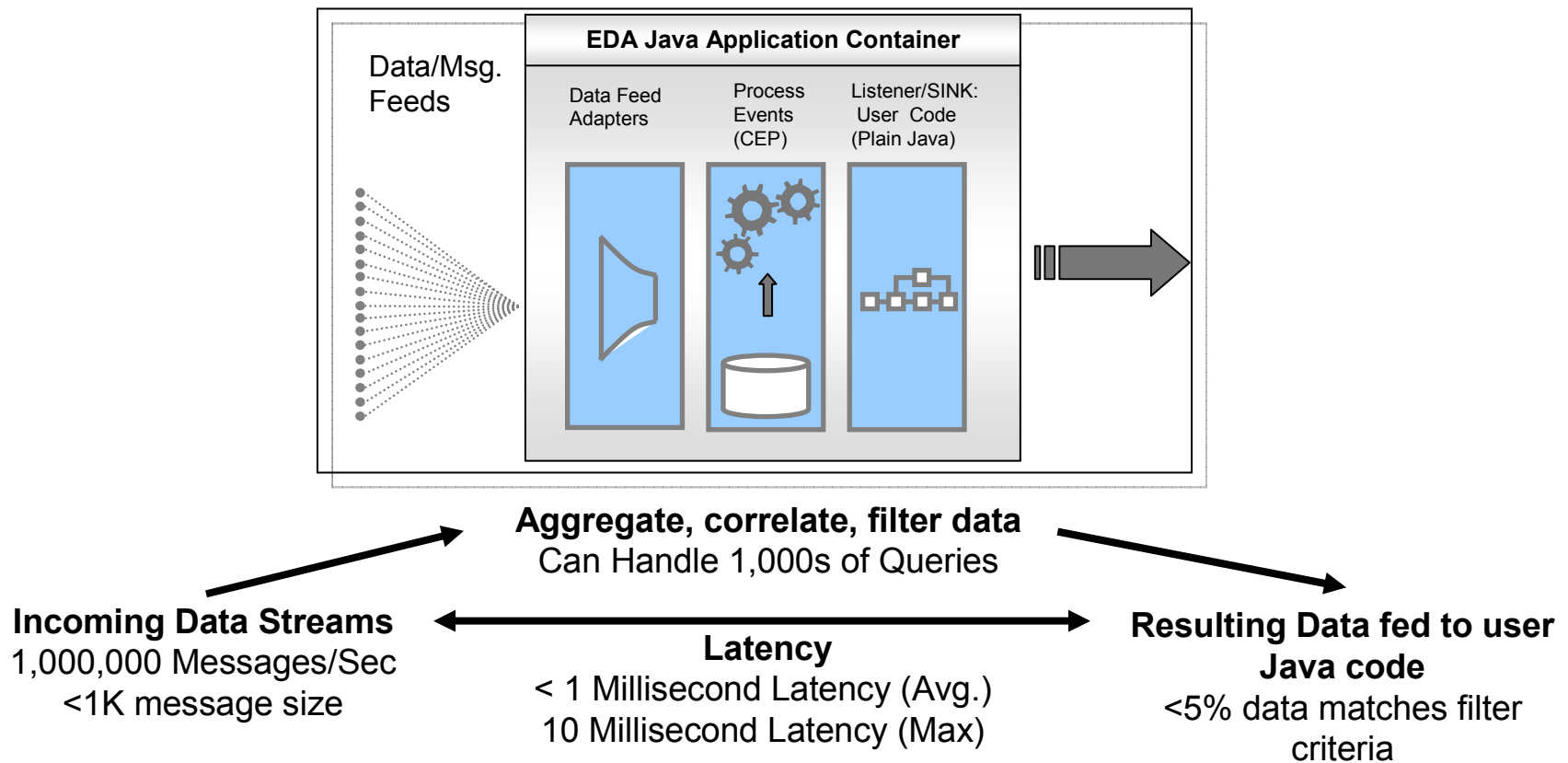
Logic is defined through Continuous Queries on the data

Example: Stock Trading "W" Pattern



EDA Foundation: Event Server

Low Latency, Extreme High Throughput, and Java-based



Patterns of Implementation





Four Classes of Event Processing in SOA

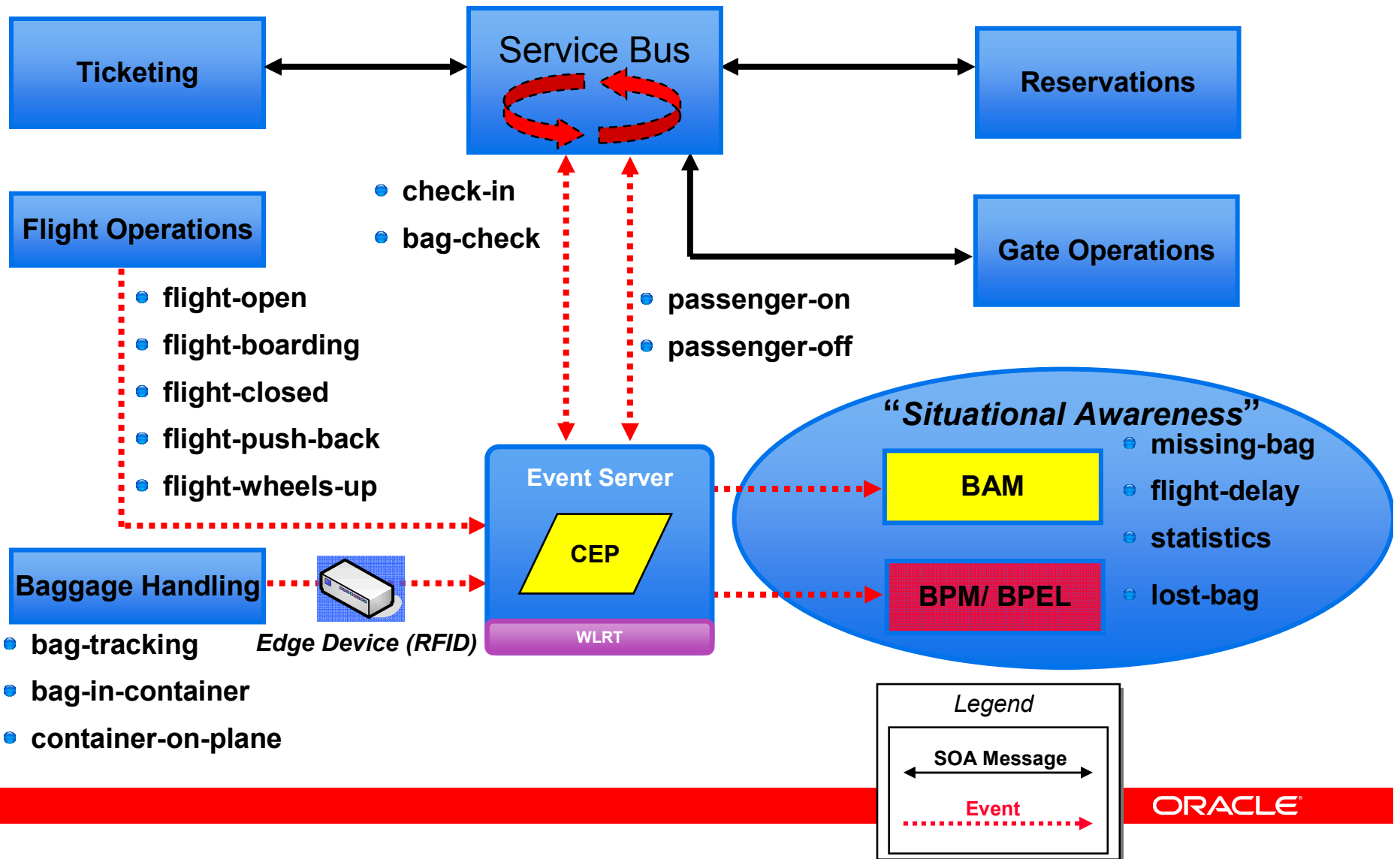
- Simple
 - Publish/subscribe model
 - Enterprise Service Bus
- Event Processing for Visibility
 - Event-driven, real-time Dashboards and Alerts
 - Business Activity Monitoring
- Complex Event Processing for Decisioning
 - Automated, algorithmic decision making
 - Event Stream/Complex Event Processors
- Event Processing Networks
 - Distributed event processing across multiple nodes
 - Distributed event networks/ event caches

ED-SOA, where/how to do what ..

Use-case	Process-based implementation	Event-based implementation
An event that can happen several times (e.g. <i>seat change</i>)		Only the final seat is interesting to the process
A message within the flow that takes a different path because of the event (e.g., <i>bag contains hazardous material</i>)	A callback from the event system into the process instance	The aggregation of several events
A set of (one-way) notifications without a direct impact (e.g., <i>passenger left check-in and entered security screening</i>)	Call to a service	Reporting in business-activity monitoring (BAM)
Callout to services/ orchestration	Only in the process!	
Macro view: several events from different process instances leading to the final outcome (e.g., <i>all passengers have passed through security screening</i>)	A callback from the event system into the process instance	A set of atomic, single instances, with the outcome based on aggregation

Air Travel Example

Event-Driven SOA and Event-Driven Architecture (EDA)



Ticketing

Service Bus

Reservations

Flight Operations

- check-in
- bag-check

Gate Operations

- flight-open
- flight-boarding
- flight-closed
- flight-push-back
- flight-wheels-up

- passenger-on
- passenger-off

Baggage Handling



Edge Device (RFID)

Event Server

CEP

WLRT

"Situational Awareness"

BAM

- missing-bag
- flight-delay
- statistics
- lost-bag

BPM/ BPEL

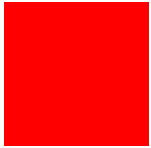
- bag-tracking
- bag-in-container
- container-on-plane

Legend

SOA Message

Event

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Demonstration





Oracle Event-Driven Architecture

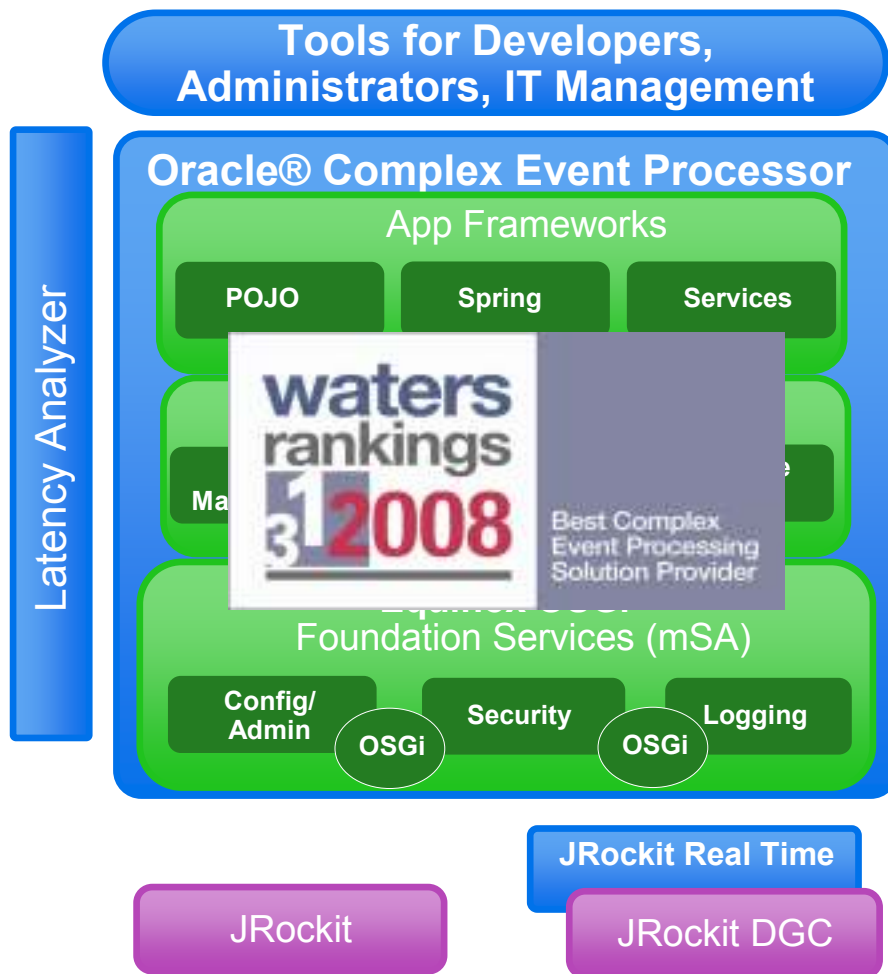




Oracle and the Evolution of the EDA Market

- 1992 Database: Oracle DML Triggers
- 1997 Database: Oracle Advanced Queuing
- 2002 Database: Oracle Data Streams
- 2004 Middleware: Oracle Business Activity Monitoring
- 2006 Middleware: Event-Driven Architecture Suite
- 2007 Middleware: Coherence
- **2008 Middleware: BEA Web Logic Time and Event-Driven**
 - JRockit JVM
 - Event Server based on OSGi™
 - Complex Event Processing Services
- **Oracle Event Processing 11g**
 - Oracle Business Activity Monitoring (BAM) java edition
 - BEA Web Logic Event Server → Oracle Complex Event Processing

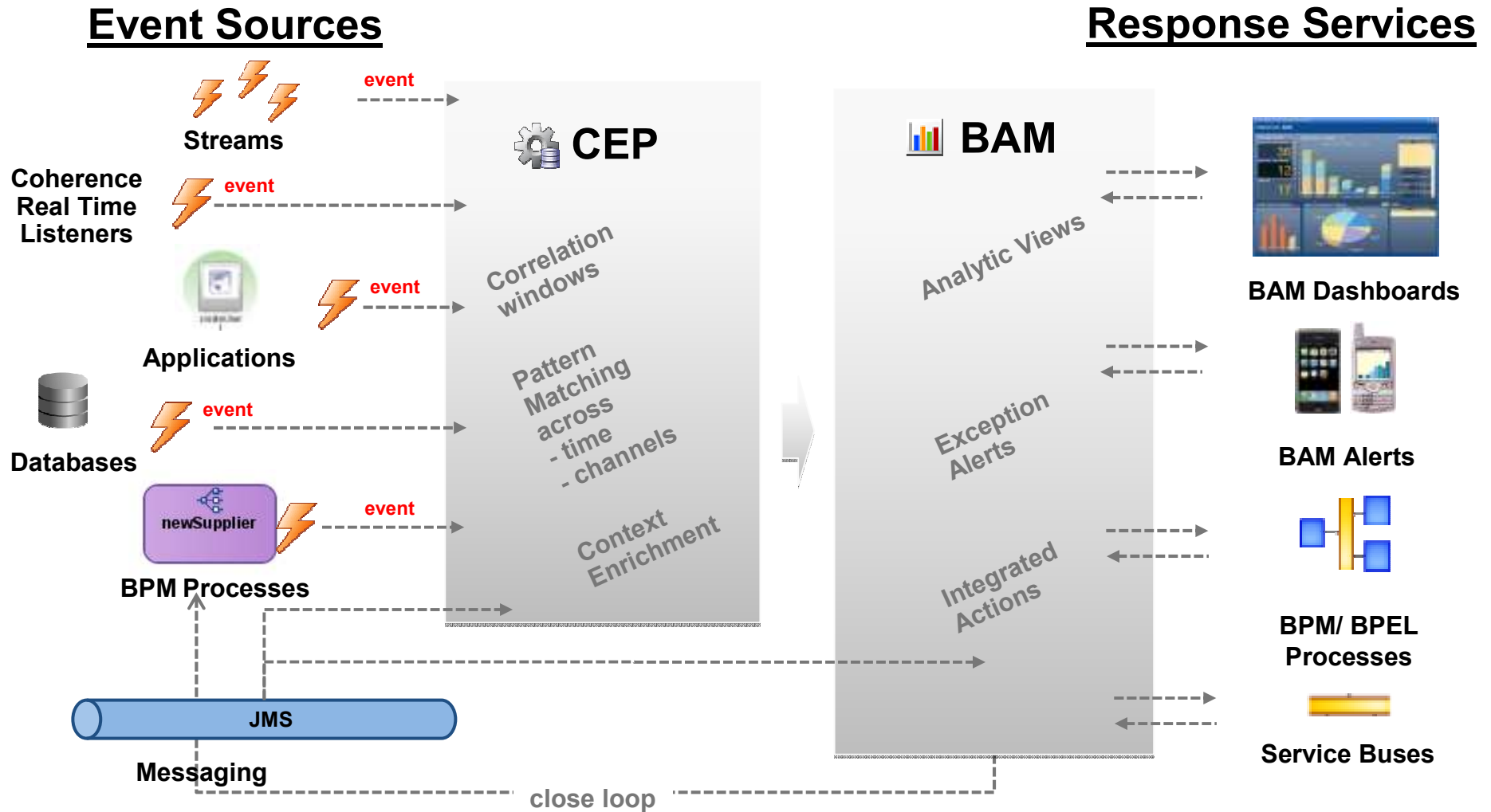
Oracle Complex Event Processing



- **Lightweight Java Application Server**
 - Full environment for building and running Java applications
 - Services -- Security, Logging, User Mgmt
- **High Throughput**
 - ▶ Hundreds of thousands of events/second
- **Event Processing infrastructure**
 - ▶ CEP Engine
 - ▶ Event Processing programming constructs and services
 - ▶ Time-critical streaming
 - ▶ Well-known event processing language
- **Easy-to-Use Development Environment**
 - ▶ Spring Framework, POJO
- **Eclipse-based tooling**
 - ▶ Plugins for EDA Application Development
- **Multiple-choice JVM**
 - ▶ JRockit or WebLogic Real Time
 - ▶ Unique JVM Tools

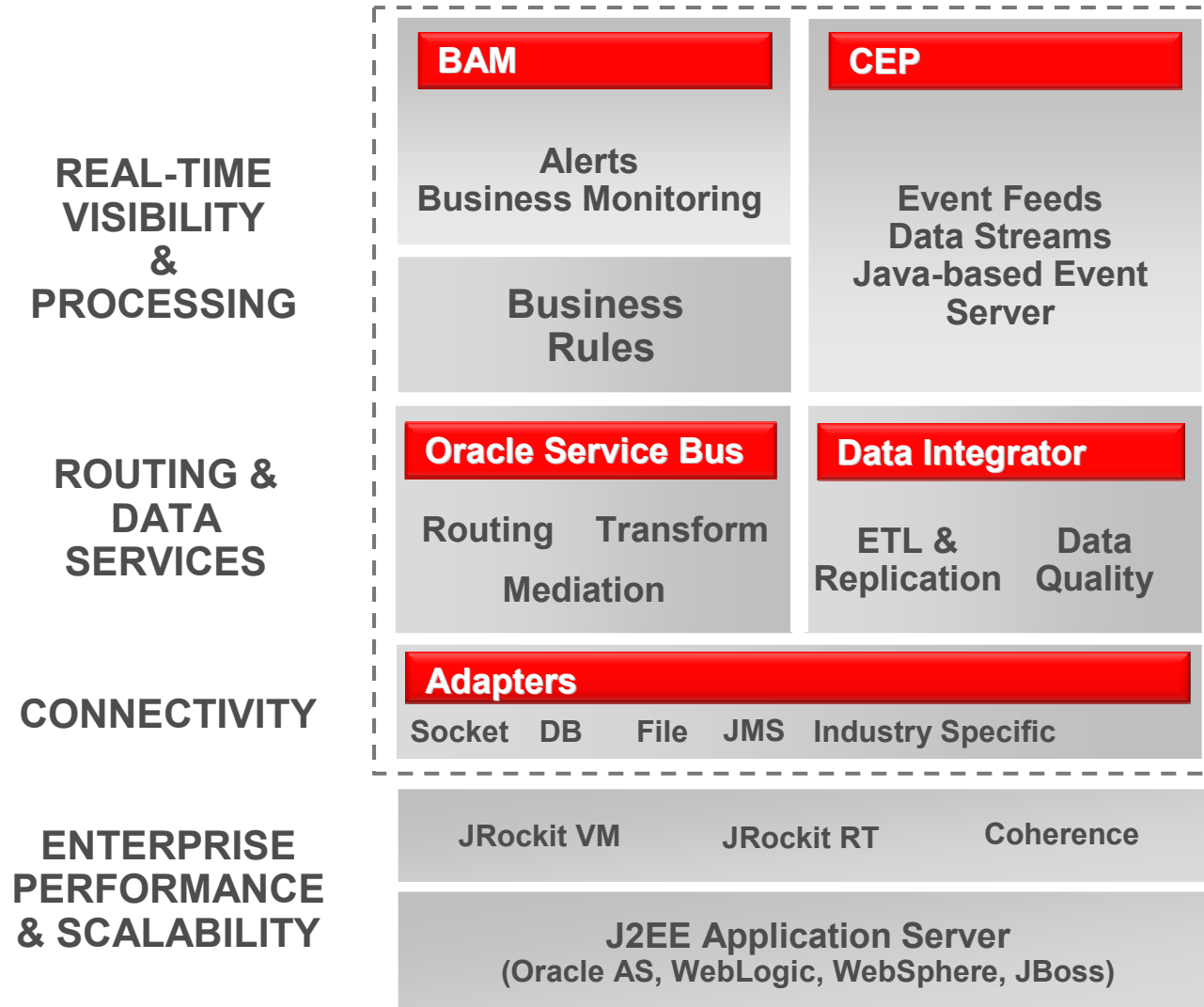
Enterprise Integrated EDA

Open Integration Strategy with OOB Optimizations for Oracle



Oracle EDA Suite

Complete Suite for Industrial Event Processing





Oracle EDA Suite

Sample Implementations

- **Oi**
 - Largest Brazilian telecommunications company
 - Monitor payment processing in real-time with Oracle BAM
 - Large throughput with 30,000 event updates per minute
- **Australian Vintage**
 - Second largest vineyard owner and manager in Australia
 - Monitor order fulfillment process in real-time with Oracle BAM
 - Oracle BAM was the first component in a SOA implementation
- **Tradeweb**
 - Over 2,000 buy-side institutions use for fixed income and derivatives services
 - Manage Indication of Interest communications with Oracle CEP/ Event Server
 - Process feeds from 200 per second to over 100,000 per second with latencies of under 10 milliseconds
- **FXAll**
 - Leading provider of automated trading and workflow solutions for foreign exchange and treasury products
 - Provide real-time VWAP service to customers with Oracle CEP/ Event Server

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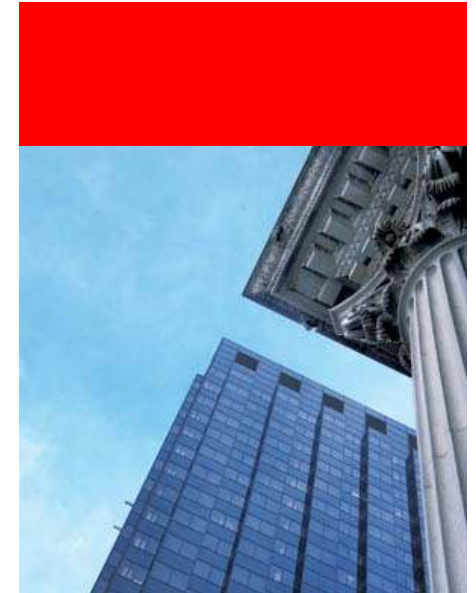


Oracle SOA

<http://www.oracle.com/soa>

Oracle EDA

<http://www.oracle.com/goto/eda>



Q & A

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