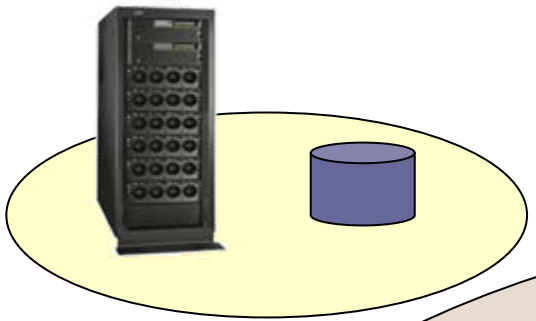
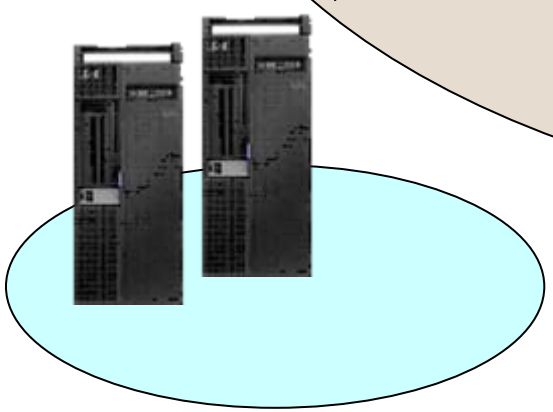
Recognizing Significant Business Events In Real Time

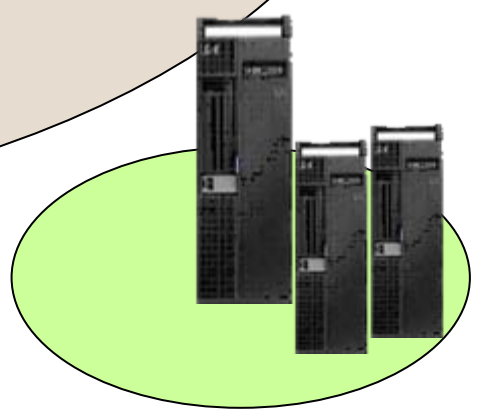
Smart Work Solutions Need To Build On Existing Systems



Smart Work Solutions

1. Build on a Strong Foundation
2. Automate Business Processes
3. Capture Business Expertise
4. Connect Everything with an Intelligent Bus
5. React to Business Events in Real Time





Business Events Are Occurring All Of The Time

Call to the help desk

Inventory movement

Web site login

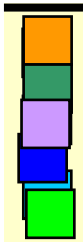
Sale is made

Business Event Definition

Any message indicating a change in the state of the business has occurred

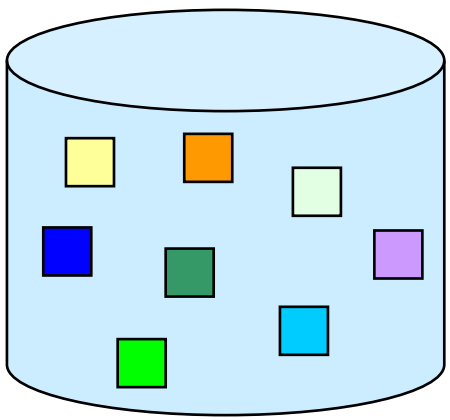
The Event-Driven World Is Different Than The Traditional IT World

Event Driven World: Data in Motion

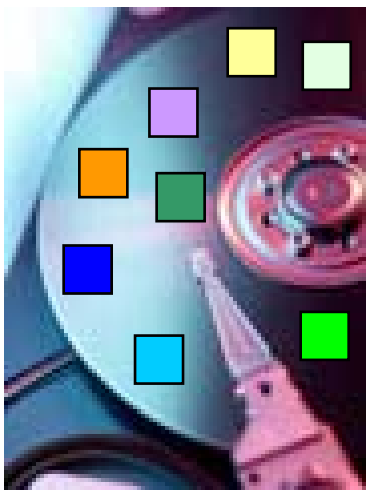


- Data have just been emitted as a result of business events
- Capture events while in transit and correlate with other events
- Detect and react to situations early based on real-time data capture

Traditional IT World: Data at Rest



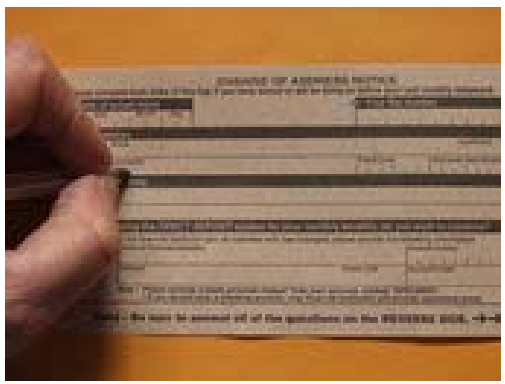
Databases



File Systems

- Data that was emitted in the past and often has an unknown age
- Requires business intelligence solutions to correlate
- More difficult to use for early detection or prediction

Event Driven Business Solutions



Business Events

Example: Multiple login attempts and a recent address change

Correlation

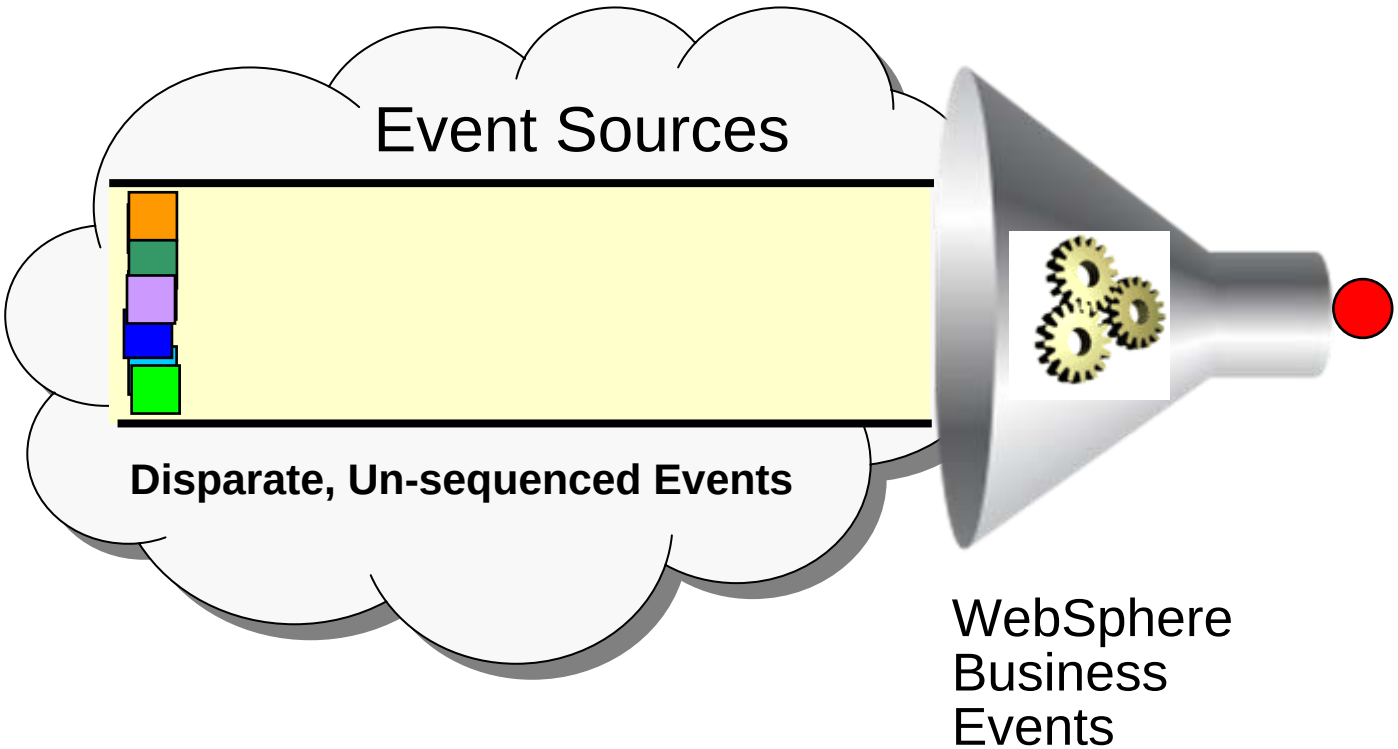
Action

Example: Alert for investigation

Event Driven Business

The ability to sense when an event or event pattern has occurred (or not occurred) – indicating an actionable business situation – and to coordinate the right response (action) at the right time.

WebSphere Business Events Correlates Business Events And Triggers Actions



- Multiple event types, different event sources
- Filters out unwanted events
- Identifies event patterns
- Events may not be ordered
- The non-occurrence of an event can be significant
- An action is sent if a matching event pattern is detected

Business Challenge

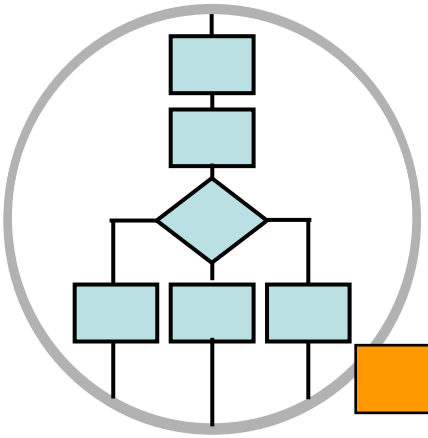
We need to detect fraudulent activities earlier to avoid serious losses.

Service Oriented Finance Compliance Officer

IBM has business event processing solutions to quickly detect potential fraud and to alert you before significant losses occur.

IBM

DEMO: Using WBE To Detect Potentially Fraudulent Transactions



New mortgage application event

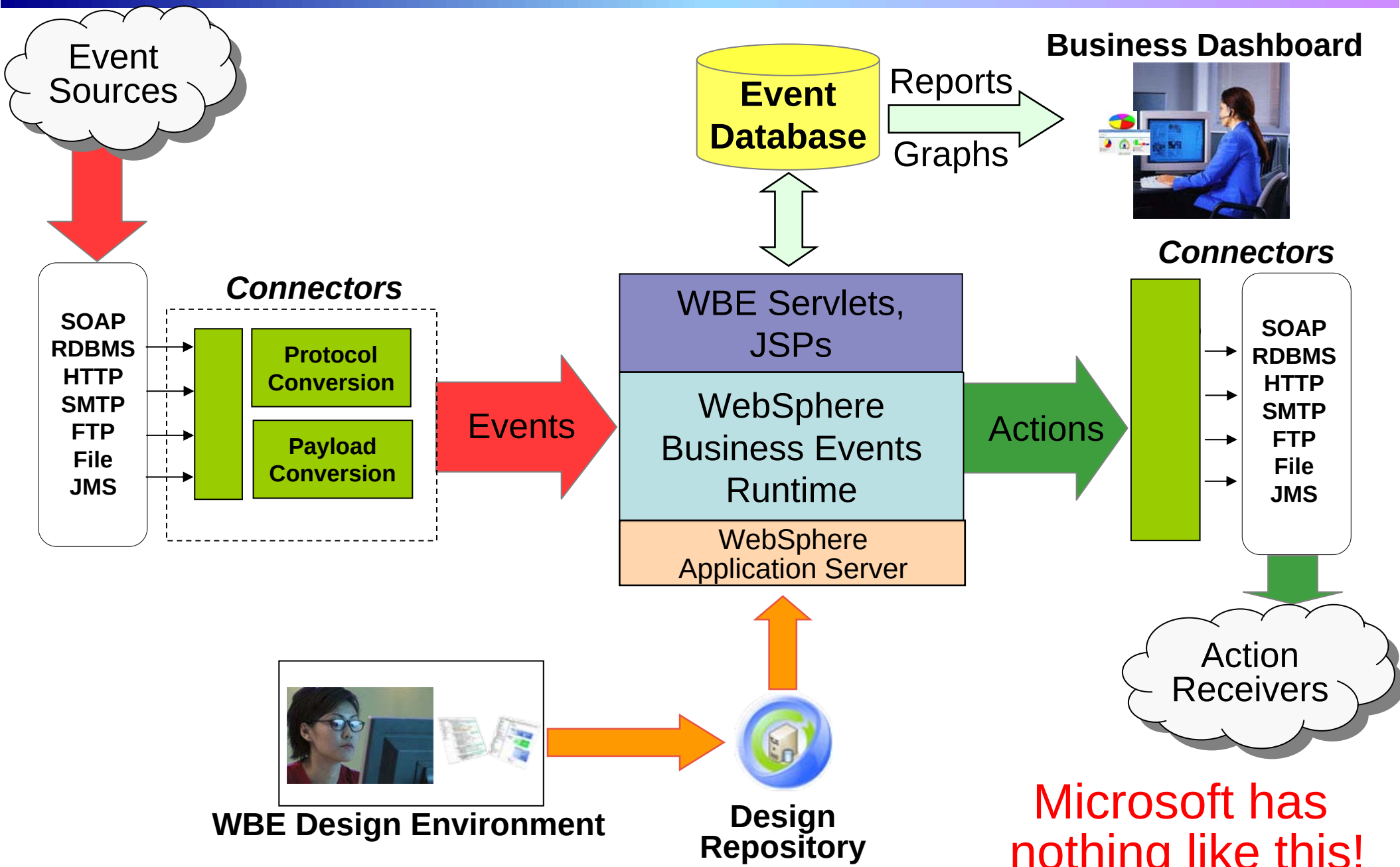
Failed ATM transaction event

WebSphere Business Events

Correlation: if these two events occur within one week, send the e-mail Action message

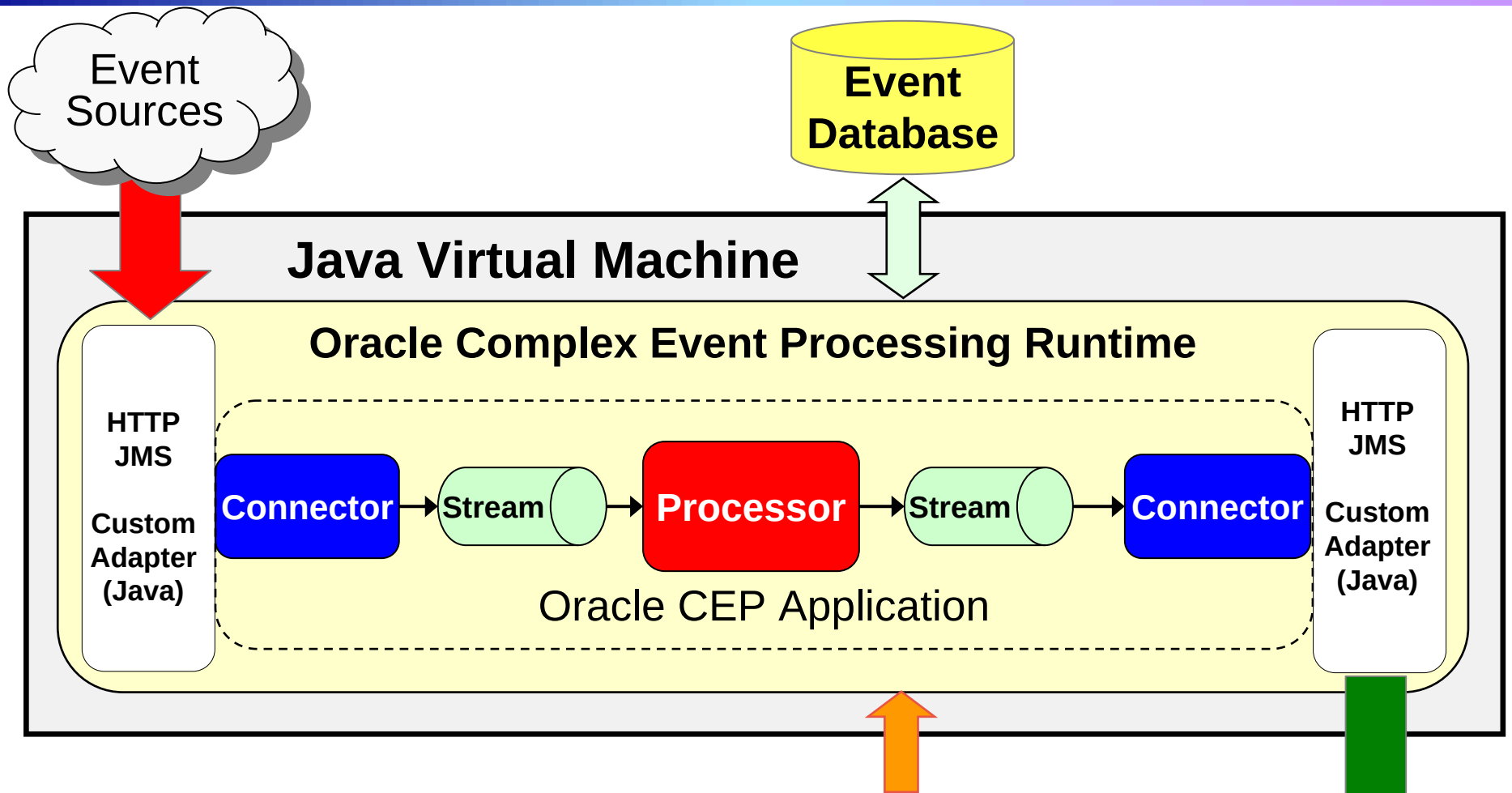
Action: send e-mail to investigate potential identity theft

What Is WebSphere Business Events (WBE)?



Microsoft has nothing like this!

Oracle Complex Event Processing (CEP) Is The Oracle Business Event Processing Solution

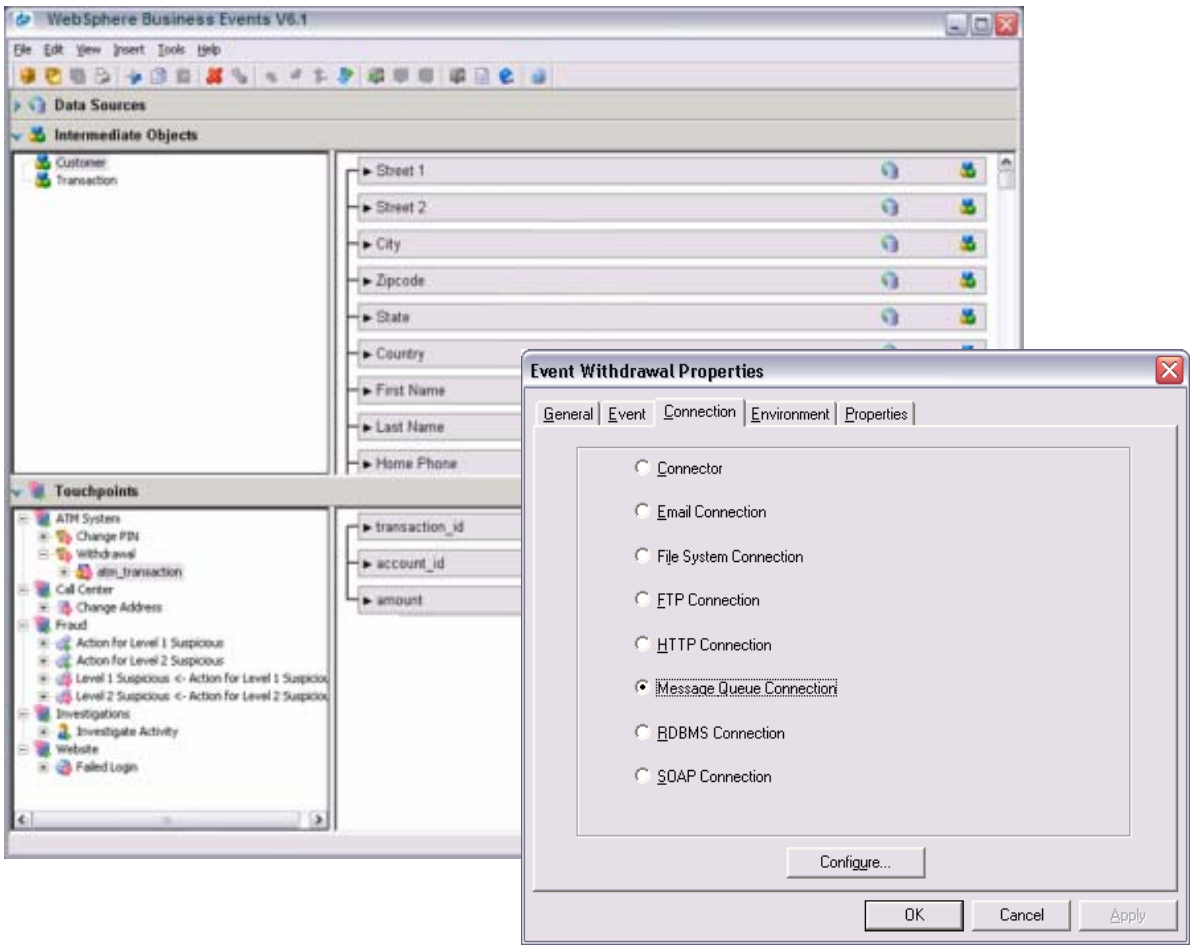


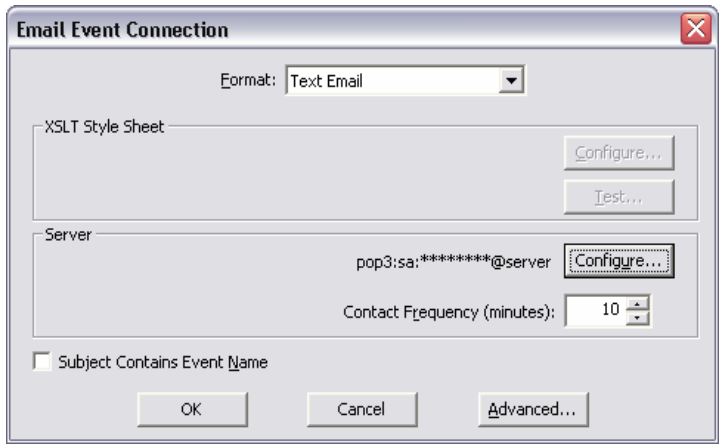
- Not built on a JEE application server
  - No included JMS messaging server
- No customizable business dashboard

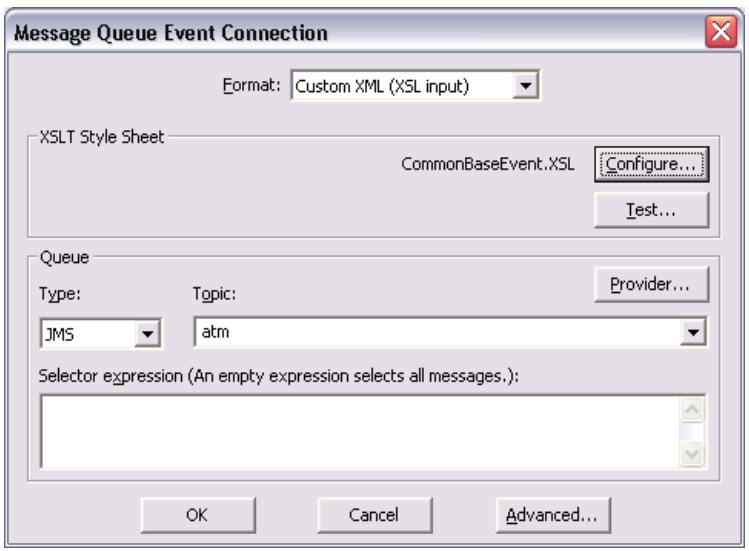
Steps Needed To Build A Business Event Processing Solution

- Define inbound events
  - How to connect (which protocol)
  - Define message fields
  - Transform message format if necessary
- Define outbound actions
  - How to connect (which protocol)
  - Define message fields
- Create event processing correlation logic
  - Filter out unwanted business events
  - Build logic that correlates multiple events over time

Defining Business Events And Actions Is Easy With WebSphere Business Events







- Graphical, menu-driven tool for defining events and actions
  - ✓ Graphical definition of events and action data fields
  - ✓ Graphical definition of event connections
  - ✓ No programming

Defining Business Events And Actions In Oracle CEP Requires Java Programming Skills

Event Data Field Definitions

```
static public class ForeignExchangeEvent {
    private String symbol;
    private Double price;
    private String fromRate;
    private String toRate;
    private Long clientTimestamp;
    private Long adapterTimestamp;
```

Event Definition

```
public class ForeignExchangeBuilderFactory implements EventBuilder.Factory {

    public EventBuilder createBuilder() {
        return new ForeignExchangeBuilder();
    }

    static class ForeignExchangeBuilder implements EventBuilder {
        private Map<String,Object> values = new HashMap<String,Object>(10);

        public Object createEvent() {
            return new ForeignExchangeEvent(
                (String) values.get("symbol"),
                (Double) values.get("price"),
                (String) values.get("fromRate"),
                (String) values.get("toRate"));
        }

        public void put(String property, Object value) throws IllegalStateException {
            values.put(property, value);
        }

    }
}
```

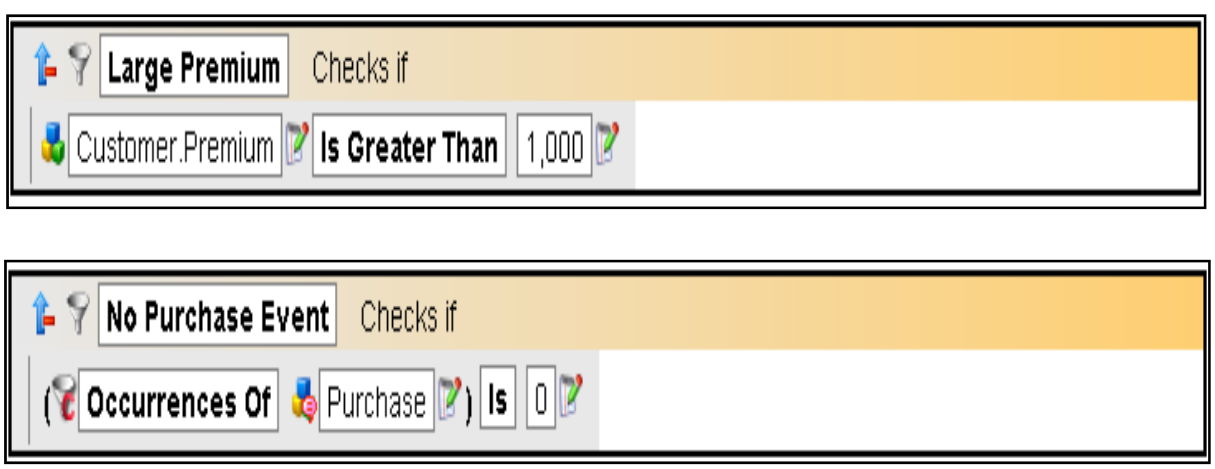
Connector Definition

```
public void run() {
    try {
        File f = new File(file);
        if (f.exists()) {
            FileReader fr  = new FileReader(new File(file));
            br = new BufferedReader(fr);
        } else {
            InputStream stream = null;
            stream = getClass().getClassLoader().getResourceAsStream(
                    "/data/symbols.txt");
            br = new BufferedReader(new InputStreamReader(stream));
        }

        String line = br.readLine();
        while (line != null) {
            SymbolEvent event = new SymbolEvent(line);
            List<SymbolEvent> events = new ArrayList<SymbolEvent>();
            events.add(event);
            eventSender.sendEvent(events, null);
            line = br.readLine();
        }
    } catch (Exception e) {
        System.out.println("File closed:    " + file);
```

- Java programming for defining events and actions
  - ✓ Java classes for definition of events and action data fields
  - ✓ Java classes for definition of events and actions
  - ✓ Java classes for definition of event connections
  - ✓ Eclipse plug-in does not provide any assists for Java programming

Correlating Business Events Is Easy With WebSphere Business Events

WebSphere Business Events provides a graphical, menu-driven tool for building business event processing correlations without programming



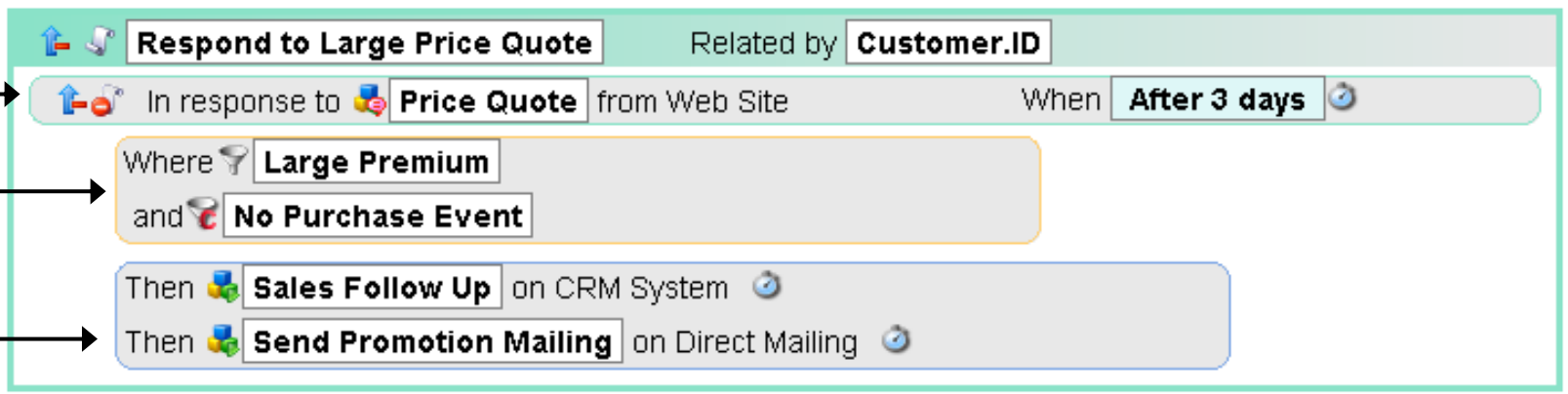
Menu-driven event filters to only select business events of interest

Menu-driven correlation rule to determine if the received event should send an action

When this event is received

Use these filters to ignore unwanted events

Send these actions



Flexibility

We're getting too many false alerts.

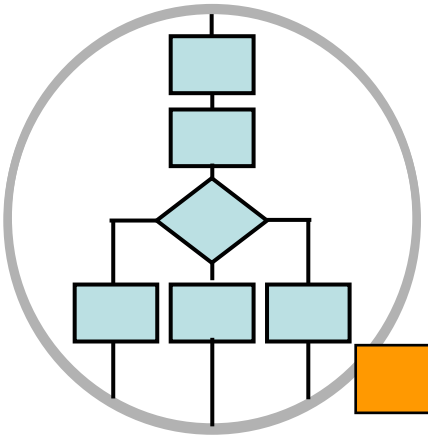
We need to change the event processing.

Service Oriented Finance Compliance Officer

WebSphere Business Events is quite flexible.

IBM

DEMO: Change The WBE Event Processing Correlation Rule



New mortgage application event

Failed ATM transaction event

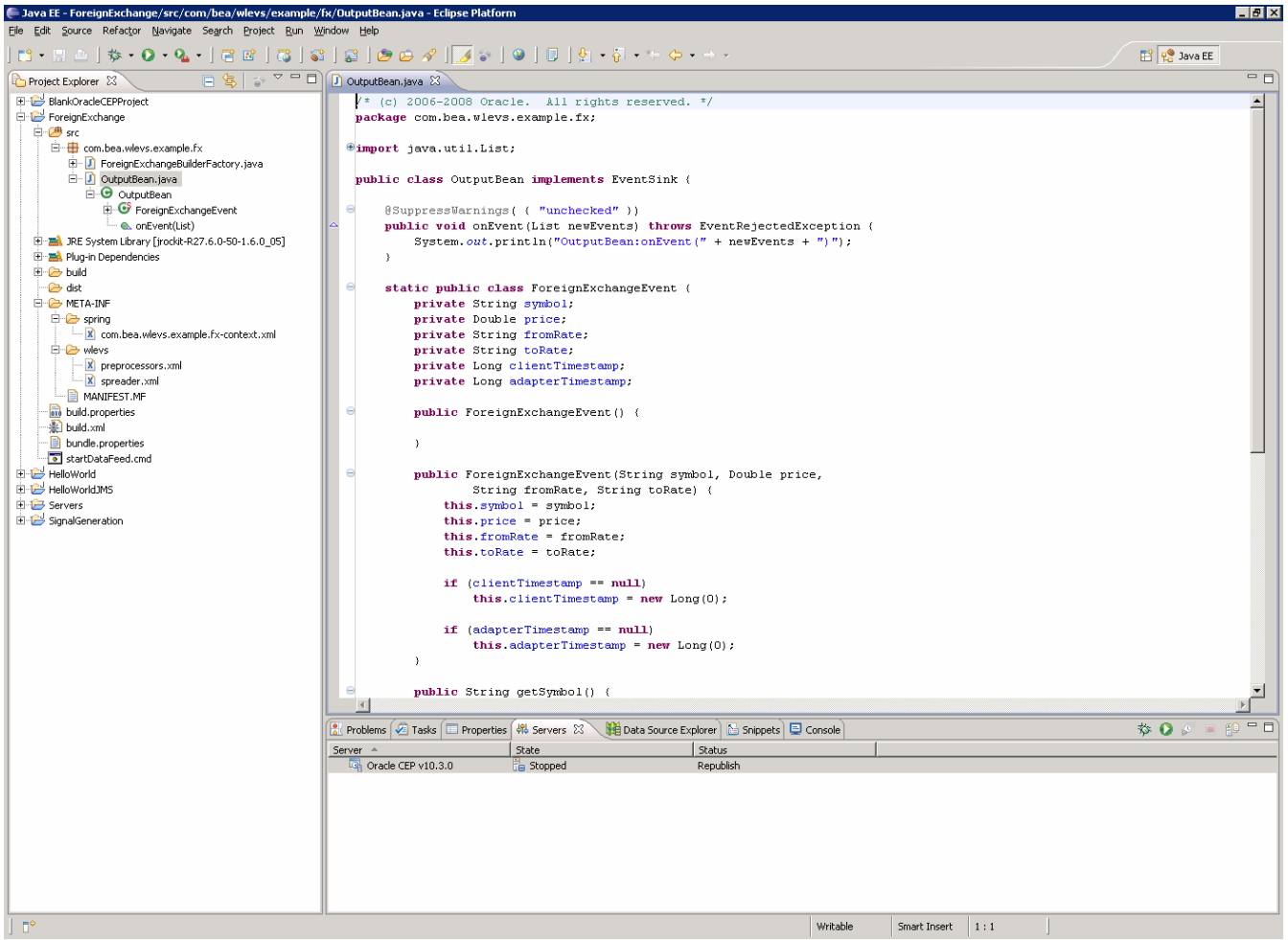
WebSphere Business Events

Unsuccessful login events

Correlation: If all three events occur within one week, send the e-mail Action message

Action: send e-mail to investigate potential identity theft

DEMO: Oracle CEP Programming Environment



- Java programming for events
- EPL programming for event correlation
- XML programming for event flow

Oracle CEP Requires Programming Skills For Event Correlation Rules And Event Flow Design

Event Correlation Rules (EPL)

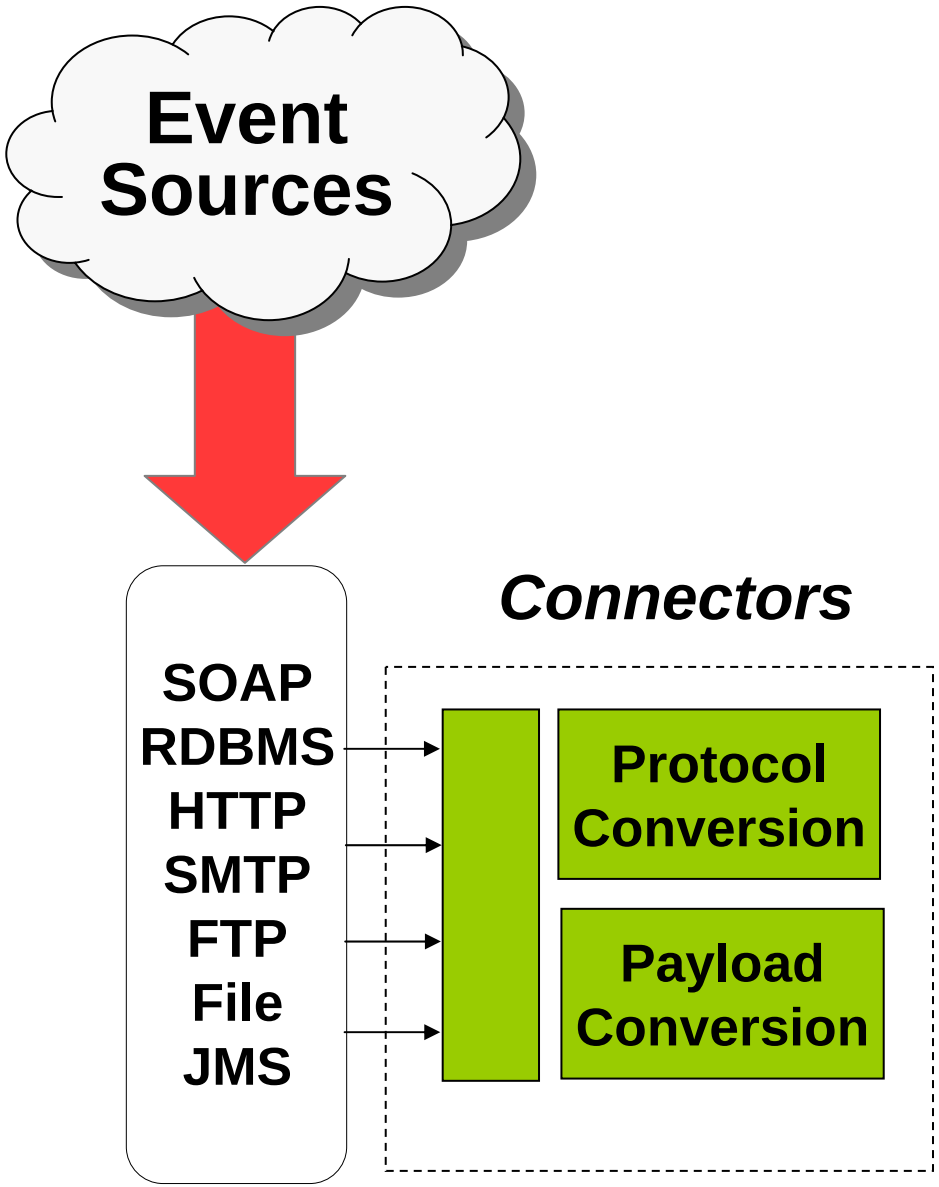
```
<processor>
    <name>preprocessorAmer</name>
    <rules>
      <rule id="UsdToEurRule"><![CDATA[

      insert into ForeignExchangeEvent
      select avg(lastPrice) as price, 'USD' as fromRate, 'EUR' as toRate
      from (select * from StockTick where symbol='USDEUR') retain 1 sec
      where lastPrice < 3.0 and lastPrice > 0.25

      ]]></rule>
    </rules>
  </processor>

  <processor>
    <name>preprocessorAsia</name>
    <rules>
      <rule id="EurToJpyRule"><![CDATA[

      insert into ForeignExchangeEvent
      select avg(lastPrice) as price, 'EUR' as fromRate, 'JPY' as toRate
      from (select * from StockTick where symbol='EURJPY') retain 1 sec
      where lastPrice < 200.0 and lastPrice > 100.0

      ]]></rule>
    </rules>
  </processor>
```

Event Flow Design (XML)

```
<!-- Assemble EPN (event processing network) -->
<wlevs:adapter id="fxMarketAmer" provider="loadgen">
    <wlevs:instance-property name="port" value="9011"/>
</wlevs:adapter>
<wlevs:adapter id="fxMarketAsia" provider="loadgen">
    <wlevs:instance-property name="port" value="9012"/>
</wlevs:adapter>
<wlevs:adapter id="fxMarketEuro" provider="loadgen">
    <wlevs:instance-property name="port" value="9013"/>
</wlevs:adapter>

<wlevs:processor id="preprocessorAmer" listeners="spreaderIn"/>
<wlevs:processor id="preprocessorAsia" listeners="spreaderIn"/>
<wlevs:processor id="preprocessorEuro" listeners="spreaderIn"/>

<wlevs:stream id="fxMarketAmerOut">
    <wlevs:listener ref="preprocessorAmer"/>
    <wlevs:source ref="fxMarketAmer"/>
</wlevs:stream>

<wlevs:stream id="fxMarketAsiaOut">
    <wlevs:listener ref="preprocessorAsia"/>
    <wlevs:source ref="fxMarketAsia"/>
</wlevs:stream>

<wlevs:stream id="fxMarketEuroOut">
    <wlevs:listener ref="preprocessorEuro"/>
    <wlevs:source ref="fxMarketEuro"/>
</wlevs:stream>
```

- Program event correlation rules in Event Processing Language (EPL)
- Program event flow design in XML

WebSphere Business Events Has Many Connectivity Options For Capturing Events



- 7 out-of-the box connectors
- No programming to configure
- Independent of WBE runtime
  - Run on WBE server or separate servers
  - More flexibility

Compare to Oracle CEP:

- 2 out-of-the box connectors
  - JMS
  - HTTP
- Must program all other connectors
- Connectors are defined within applications
  - Must run on Oracle CEP server

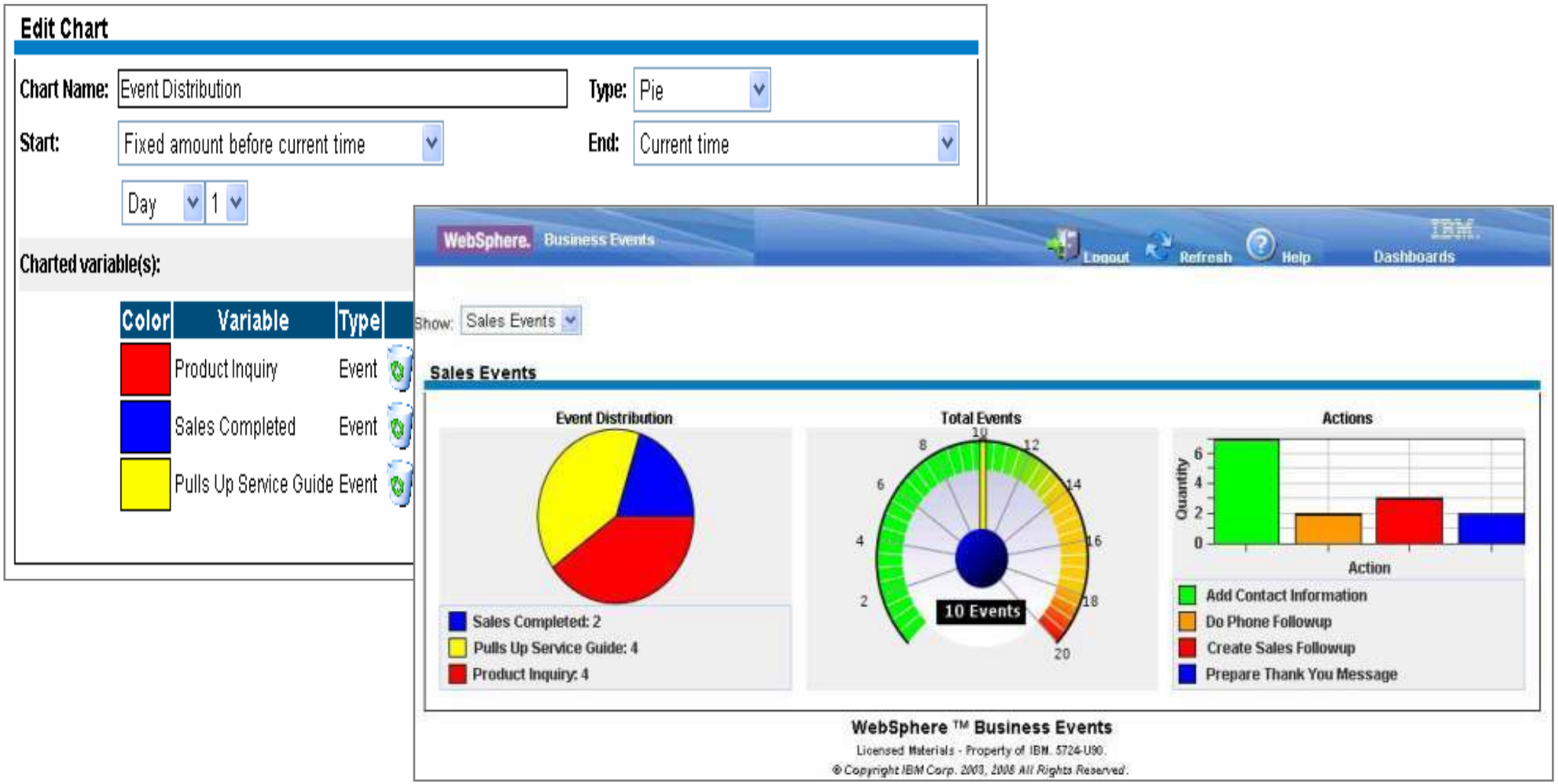
WebSphere Business Event Tools Help You Build A Solution Faster

Case study: Build a simple business event processing application

Task	WebSphere Business Events	Oracle CEP
Event connections (3)	37 configuration panels 9:56	145 lines of code 57:45
Event correlation rule (1)	2 configuration panels 1:20	6 lines of code 3:06
Application flow	Not applicable	11 lines of code 4:47
Totals	39 configuration panels 11:16	162 lines of code 65:38

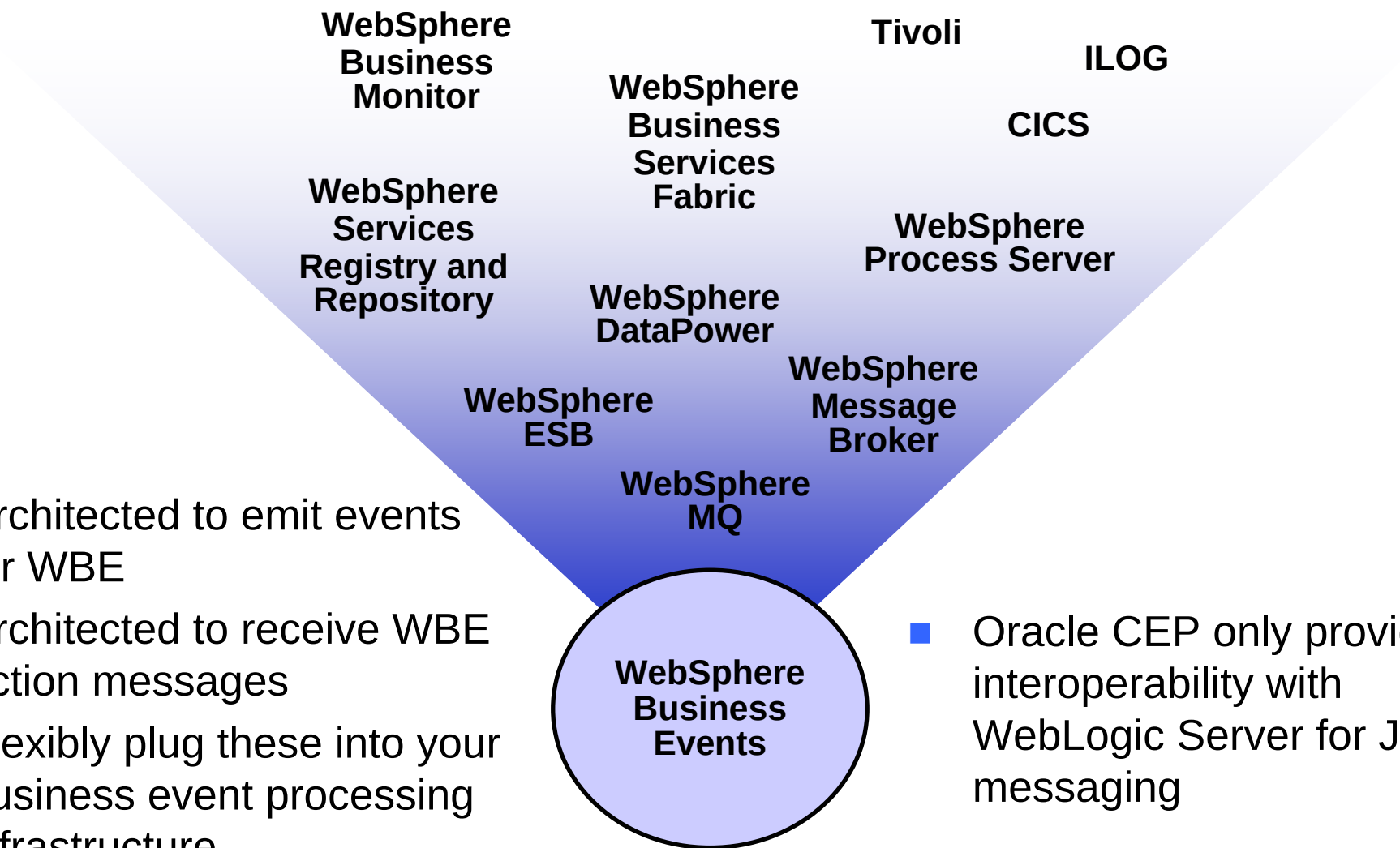
WebSphere Business Events builds solutions nearly 6x faster !

Build Custom Event Dashboards And Reports To View Event History



- Build a business dashboard with menu driven tools
- Oracle CEP does not provide custom dashboards or reports

WebSphere Business Events Integrates With The Core WebSphere SOA Portfolio



- Architected to emit events for WBE
- Architected to receive WBE action messages
- Flexibly plug these into your business event processing infrastructure

- Oracle CEP only provides interoperability with WebLogic Server for JMS messaging

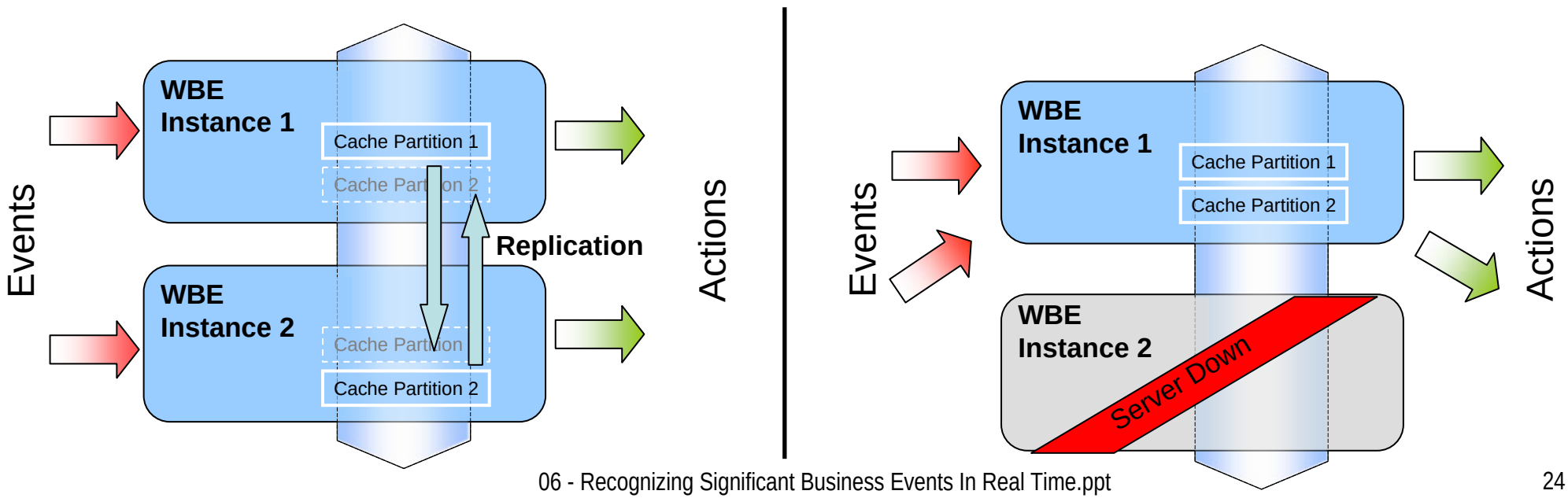
Examples Of WebSphere Business Events Integration With IBM SOA Portfolio

- WebSphere Process Server
  - Any step in a process flow can emit events (no programming required)
  - WBE messages can initiate a WPS process
- WebSphere ESB and WebSphere Message Broker
  - Special node in mediation flow emits events
  - Special node in mediation flow receives action messages
- WebSphere Business Monitor
  - WBE includes schemas to understand and transform event messages from WebSphere Business Monitor
- CICS
  - Can emit event messages already formatted for WBE consumption

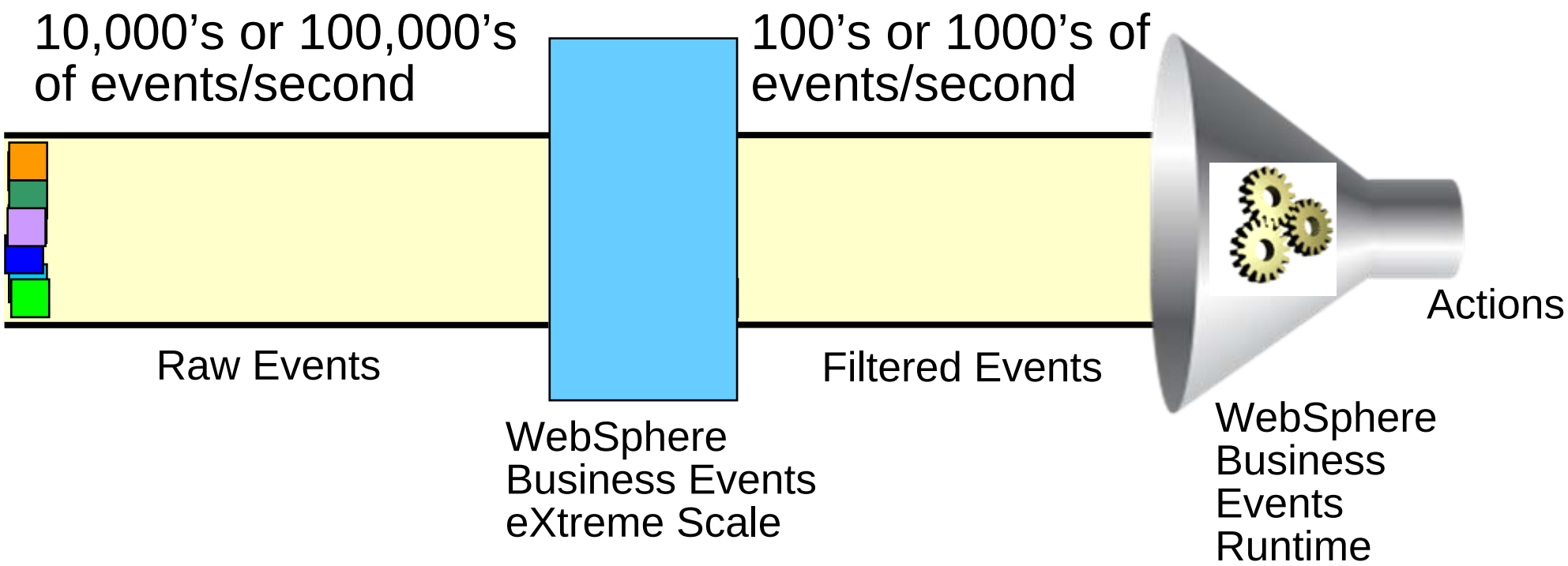
WebSphere Business Events Clustering Provides Scalability And High Availability

- Intelligent partitioning of business event processing across multiple machines
  - Horizontal scalability across CPU and memory resources
  - Using standard WebSphere Application Server ND Cluster

- High availability supported by failover between cluster members
  - Optional in-memory replication for failover
  - Database-backed when file based persistence is required



Add WebSphere Business Events eXtreme Scale To Handle Extreme Volume Of Business Events



- Efficient pre-filtering of massive streams of raw events
- WBE then detects actionable events through pattern recognition
- Oracle does not offer a high-volume event pre-filter

Large North American Bank Improves Customer Retention And Responsiveness With WebSphere Business Events

Business Challenges: Improve customer acquisition and cross-selling capabilities, maximize revenue opportunities, and deliver new products to new customer segments.

Solution: Use WebSphere Business Events to correlate patterns of changes in customer payments and bank account activity

- Early identification of customers that are potentially distressed or at risk of moving their accounts to other banks
- Alert bank personnel to immediately engage with these customers to improve customer retention and ensure positive customer relationships

Results:

- ✓ Improved customer confidence and satisfaction
- ✓ Retention of profitable customer relationships
- ✓ Prevention of costly defaults

Summary

We've described the advantages of WebSphere Business Events over Oracle, but the main thing to remember is that . . .

IBM

Summary

. . . It’s a lot easier to use !

IBM