Amit - External Introduction

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Active Middleware Technologies
The Amit technology is based on the observation that in many cases an action is not triggered by a single event, but by a complex composition of events happening at different times and at different contexts.
Amit Capabilities

- **Automated Rule creation**
  - Wizard guided authoring, no programming skills are required to compose situation definitions
  - Ability to update rules online, no shutdown required
  - No technical staff required

- **Well Tested, Product level**

- **In addition, Amit provides an intelligent real time framework that combines the following features:**
  - **Complex Event Processing** - conditions defined based on the event history (as opposed to conditions on single events)
  - **Temporal awareness** – define the time frame that is relevant to the condition
  - **Expressive** – a rich, high level, language to define situations
Amit - Business Objectives

✓ Improve sales of the WBI (e.g. WBI Message Broker) by showing off its unique capabilities:
  ▪ Library of pre-built processing nodes
  ▪ Industry-leading end-to-end performance

✓ Beat competitors to the emerging markets in event services and business rules.

✓ Demonstrate superiority to pub/sub arena
  ▪ Multi-level event processing
The Business Opportunity

"On average, our trains today travel only at 17mph. If we can increase our average speed by only 1 mile, we would recognize approximately $140M" — A US Railway

What would solve the problem?

- Identification of Composite Events & Temporal Awareness
- Real Time Detection of Problematic Situations
- Complex event information: at the right time, to the right place, in the right format
- Proactive actions

Action triggered not by a single event, but by a complex composition of events, happening at different times, and within different contexts
Gartner sees “Complex Event Processing” as an emerging market.

“Enterprises will achieve new levels of flexibility and a deeper understanding of their business processes by applying the techniques of complex event processing (CEP) to their daily work.”

“CEP agents will analyze, correlate and summarize these low-level events into higher-level events suitable for notifying people in human terms or for triggering automated processes. Businesses will operate more efficiently, with early warning of potential opportunities and problems, and with better understanding of the root causes that change conditions.”

IBM partner, Bristol Technologies, has lined up to be among the first to take advantage


“The integrated solution of Bristol Technology’s TransactionVision and the IBM ECS Technology is unique in its ability to collect events, compose them into business transactions, and then recognize patterns in these transactions that help customers make real-time decisions. Customers will impact critical business processes, such as exception management, by detecting and resolving exceptions quicker.”

--- Ken Blackwell, CTO, Bristol Technology.
Amit Differentiators:

1. **The ONLY technology to combine the following features:**
   - **Situations** - conditions defined based on the event history (as opposed to conditions on single events)
   - **Temporal awareness** – define the time frame that is relevant to the condition
   - **Expressive power** – a rich, high level, language to define situations

2. **Ease of use**
   Wizard guided authoring, no programming skills are required to compose situation definitions

3. **Tightly integrated to WBI Message Broker**
   The fastest broker in the market

4. **High Performance**
   Magnitude of thousands of input events per second

5. **Eclipse based Authoring Tool**
Amit – How you can get it?

- Amit has been developed during the last 5 years in the Active Technologies Department (IBM Haifa Research Lab) within the Amit (Active Middleware) project

- Amit is publicly available
  - As a product extension for WBI Message Broker
  - Embedded in a Business Partner’s product (Bristol)
  - As a stand alone engine from IBM Research on negotiated terms

- Can be offered as a:
  - Product
  - Service
  - Part of solution
Amit – What it does?

Bridges the gap that exists between events reported by various channels and the reactive situations to which the system should react.
Amit et Al

Amit/WMQI-based solutions

Amit/WMQI node

Amit

Amit Exception Handling

Amit / Exception Handling based solutions (e.g. Insurance)

Amit-based Solutions
Amit and its context – High level

- Exception Handling Metadata
- Exception Handling
- Action Manager
- External (pub/sub)
- ARAD

GUI

Amit Tooling

Rule-based
Model-based

Amit Metadata
(Definition Manager)

ADI Model
Templates

Events
Rules

Definitions

Situations
Conclusions
Alerts
Exceptions

Create new Events
Change Definitions

Exceptions
Detections

Exceptions

Events
Instances
Amit - Example of Scenarios

- **Service Level Agreement alerts**
  - Alert if three orders from the same platinum customer were rejected for the same reason during a 24-hour period
  - Alert me if an order was sent for processing and no response was received within the time specified by the SLA

- **Compliance Checks**
  - Non trivial credit breach policy – report if a client performs more than X messages that cause credit breach in one day, or if the breaching exceeds a certain threshold.
  - Regulatory constraints – report on a bulk buy transaction that is performed less than the regulatory allowed time after a bulk sell.

- **Fraud Detection**
  - Report when multiple credit card purchases are performed within an hour or (any given time frame) at a distance greater than 300 km (or any given distance).

- **Aggregation**
  - Report at a set time (e.g. the end of a business day) the number of purchase requests that were processed, their total dollar amount and the average dollar amount.

Finance    Travel    Security    Retail    Insurance
Amit uses (1) - Finance Scenario

- **Trade Regulation Breach**
  Amit verifies that sells and subsequent purchases of large quantities of stock meet regulatory requirements

- **Credit Breach**
  Amit initially allows a credit limit to be exceeded (by no more than 10%). The second time the limit is exceeded, Amit routes the order to a credit officer for approval

- **Trade Execution Delay**
  Notify if a purchase order was sent for processing and no response was received within the time specified by the SLA
Amit uses (2) - Travel Scenario (Rail)

On-board diagnostics

Unusual situations are identified
Amit uses (3) - Security Scenario

Homeland security

Unusual activity
Amit uses (4) - Retail Scenario

On Demand eCRM:
Based on past history of customer AND current actions in the store, the system will be able to offer customized advice and promotions while the customer is shopping.

Example:
Platinum customer placed in cart more than 100€ worth of ingredients for making Fondue, the system will recommend appropriate wine and offer a special promotion.
Amit uses (5) - Insurance Scenario

- Amit helps improve claim processing by automating key activities such as:
  - Identifying invalid claims
  - Detection of potential fraudulent claims
  - We can help release delayed payments according to pre-specified conditions.
  - Identifying problematic health insurance providers that do not comply with regulations.
Amit / WBI-MB – Technology Overview

**Build Time:**
- Rules & conditions are composed using a wizard based authoring tool

**Runtime Time:**
- Events of different format and from multiple sources are fed in
- Amit SituationManager analyzes incoming events & situations based on current rules & conditions
- Upon detection the situations are sent out as messages
- Situations are also fed back into the SituationManager and treated as incoming events
Amit definition building blocks

- **Events**
  Format of messages

- **Lifespans**
  Relevant time frame, temporal context

- **Database**
  Whether message should be compared with a data base record

- **Situations**
  - Business rules based on a set of operators:
  - Situation attributes

- **Rules**: (Events, Lifespans, Database) → Situations
Situation Manager node

- Performs an observation task – the flow of the messages is not affected in any way
- A wrapper around Amit
  - Can use the full set of operators provided by Amit core
- Situations are detected asynchronously
  - Not necessarily as a response to an incoming event
- When situations are detected, a message is posted to an MQ queue
  - Can be read by another flow, or by an external application
Intelligent Filter Node

- Performs a routing task - input messages are routed to one of the two output terminals.
- Output terminal is determined according to whether a situation was detected or not.
- Amit core operates in synchronous mode (some temporal features are disabled).
- Outgoing message can be enriched with a description of the detected situation.
AMIT IDE – Context Editor

customerSellAfterBuy (sequence Situation)

**General Information**
This section describes general information about this definition.

- **Created By:** Ilan
- **Created On:** 01/04/04
- **Updated By:** Ilan
- **Updated On:** 11/04/04

**Events**

<table>
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<tr>
<th>Name</th>
<th>Alias</th>
<th>Threshold Condition</th>
<th>Quantifier</th>
<th>Quantifier Type</th>
<th>Override Condition</th>
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<td></td>
<td>last</td>
<td>relative</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td>last</td>
<td>relative</td>
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<td></td>
</tr>
</tbody>
</table>

**Keys**

<table>
<thead>
<tr>
<th>Name</th>
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</thead>
<tbody>
<tr>
<td>stockSymbol</td>
<td></td>
</tr>
<tr>
<td>customerName</td>
<td></td>
</tr>
</tbody>
</table>

**Definition description:**
Finds speculative customers that sell their shares with profit after a short time
Tooling – How to develop an Amit Application

- Define the structure of the **events** - messages flowing in the system (an automated utility to load MRM message structure is in development)

- Define the **situations** that are relevant to the scenario

- “Compile” the definitions (for verification of the definitions) and export them to an XML file

- Place the XML file in the location specified in the node properties dialog

- Start the message flow
Runtime definitions updates

- Amit should work in systems that run 24 X 7 in dynamic environments, where rules may change.
- Amit enables online adding, removing and modifying definitions while it is running, without having to shutdown and restart.
- Whenever the business rules change, you can update the nodes’ functionality accordingly.
Amit Performance

- **Effective** - Expressive, general purpose language for situation definition
- **Efficient** - Fast Algorithms -> High Performance

from 2,000 events/ sec up to 120,000 depends on:
- Detected situations vs. incoming events instances
- % of events participate in situation definition
- Number of concurrent open lifespans
Exception Handling using Amit

- Exceptions are raised when data that is updated in the enterprise repository or reported to a business component, violates a constraint or a business rule. In this case, the transaction that issued the update command is halted until the exception is resolved.

- Today over 35% of the cost of trade processing is associated with manual procedures to handle rejected or non-standard transactions.

- Real time exception handling reduces cost considerably.
  - It reduces the time required to detect an exception.
  - It reduces the volume of manually resolved exceptions.
  - It speeds problem resolution in cases where manual intervention is required.
Example

- Violation: A customer exceeded its credit limit
- Stabilizers interpretation:
  - Restrict: abort the transaction.
  - Cascade: update the credit limit.
  - Repair: update the amount to the maximal amount that will not violate the credit limit
  - Forgive: record for manual resolution.
  - Apply: call user defined function to resolve
AMIT differentiators - Summary

1. **Time to market equals zero.**
   - **Mature Technology:**
     - Amit can currently be installed at customers site (stand alone or integrated within other products or solutions)
     - can provide basic event catalog, event dispatching, fault tolerance etc, and
     - can be connected to legacy environments (WBI-MB, Swift, third party environments).
     - AMIT provides a complete middleware services in this area.
   - **Support:** The Amit team includes 15-20 people that supports Amit at all levels, members of the AMIT team have various backgrounds, and can support business environments.
AMIT differentiators - Summary (Cont.)

2. Amit is the most comprehensive solution in the industry today; It is the only technology to combine the following features:
   - **Situations** - conditions defined based on the event history.
   - **Temporal awareness** – define the time frame that is relevant to the condition. Supports sliding timing/context window as well.
   - **Expressive power** – a rich, high level, language to define situations, that enables to deliver complete solutions based on AMIT.
   - **Complex Event Processing** - AMIT follows Gartner view
AMIT differentiators - Summary (Cont.)

3. AMIT does not require programming skills. Providing competitive ease of use to external business rule engines.
   - Wizard guided authoring; no programming skills are required to compose situation definitions.
   - There is a possibility to use templates as "meta-rules". The system designer prepares a set of domain specific templates, and non-programmer end-user can then instantiate the template to create rules.
AMIT differentiators - Summary (Cont.)

4. AMIT is a self contained product that can plug-in easily in legacy environments.
   - AMIT Can support multiple event structures – e.g. SWIFT, MRM messages, CBE events and more. This includes complex data structures
   - Tightly integrated to WBI Message Broker
     - This combination enriches WBI message broker, the fastest broker in the market, with easy capability of message composition.
     - Dynamic updates to routing rules (and other rules) without the need to stop the engine – this enriches the message broker to be able to change its behavior, and still maintain the 24 X 7 capabilities (comments: the dynamic rules support without the need to stop the engine is generally applicable, not only in the WBI-MB environment).
   - Set of domain specific interfaces:
     - Financial Markets, banking, Insurance, Payments, Intelligent Notification services
   - Eclipse based Authoring Tool
     - Aligns with overall WebSphere strategy
     - Easy tooling deployment to have the same “look and feel” with other IBM products
AMIT differentiators - Summary (Cont.)

5. **AMIT is a high performance tool.**
   - Magnitude of thousands of input events per second
   - Ability to publish thousands of situations, alerts (or invoking other programs) per second.
   - Based on a published benchmark that is proposed as a benchmark in this domain.

6. **AMIT provides reliability assurance.**
   - Fully tested by an external testing team. Since it is a full-fledged programming language, the testing is difficult and requires domain knowledge to cover feasible paths within the program.
   - A testing-bed environment is supplied (includes: simulations, regression tests and other testing capabilities)
AMIT differentiators - Summary (Cont.)

7. **Self-contained and middleware approach.**
   - Provides self-contained product that can plug-in to any legacy environment easily
   - May include multiple engines.
AMIT - Summary

- Research and development
- More than five years ago technology
- Large development and support team dedicated to it
- The best product in the domain of complex event processing in the industry
- Robust, highly expressive
- Complex and intricate rules and conditions can be easily implemented
- Ongoing activity – additional features and tooling are being developed