IBM Software Group

Event-Driven Architecture and Service-Oriented Architecture

Bobby Woolf, IBM Software Services for WebSphere

WebSphere software

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What is Event-Driven Architecture?

- EDA is integration of applications via event notification
  - *Event* – An occurrence, can be detected and recorded, and of interest
  - *Event record* – An *event* that has been detected and documented
    - *Actual* events and *derived* events
  - *Event message* – An *event record* that can be transmitted
  - *Event type* – Defines the structure and meaning of an *event record*
  - *Emitter* – An *event message* sender that announces an *event*
  - *Handler* – An *event message* consumer that receives notification of an *event*
  - *Event channel* – A message channel that connects *emitters* to *handlers*
    - A handler registers as a dependent of a channel to receive notifications
  - *Event processing network* (EPN) – A set of mediations between *emitters* and *handlers*
    - Event mediation can perform *complex event processing* (CEP)
    - Event mediation can include *event correlation*
  - *Channel registry* – An index of *event channels* which can be queried
  - *Event bus* – A set of *event channels*; can implement an *event processing network* and have a *topic registry*

Event-Driven Architecture and Service-Oriented Architecture

- Synergy; applications may use both
- A component should use SOA to *invoke a service* when:
  - It knows exactly what service it wants to invoke
  - It wants to invoke the service exactly once
  - It wants notification when the service completes
  - It wants to receive the results of the service
- A component should use EDA to *announce an event* when:
  - It wants to notify all receivers that might be interested
  - It doesn't know what receivers might be interested
  - It doesn't know how receivers will react to an event
    - Different receivers may react differently to the same event
  - The communication is one-way, sender to receiver

EDA, SOA, and Services

- Both invoke services
  - Service selection is different
- An event handler reacts to an event by invoking a service
  - Handler decides whether to react and what service to react with
- SOA consumer:
  - Specifies service to invoke
  - Invokes service once
  - Waits for result
- EDA emitter:
  - Publishes event to multiple handlers
- EDA handler:
  - Receives event
  - Reacts by invoking service

EDA, SOA, and Programming Techniques

- Two kinds of receivers: service activator and event handler
- SOA service activator
  - Receives invocation request
  - Runs service
  - Sends invocation response
  - Always invokes the same service
- Event handler
  - Receives event
  - Invokes service
  - May choose amongst multiple services
  - May ignore event entirely
  - May correlate multiple events
- A particular service may be invoked both SOA- and EDA-style
  - By a service activator or an event handler

EDA, SOA, and Enterprise Service Bus

- ESB
  - Connects service consumers to service providers
  - Connects event emitters to event handlers
- Transmits service requests and event notifications
- Point-to-point vs. publish/subscribe
  - Service invocations and replies use a pair of queues (usually)
  - Event notification uses a topic (usually)
- Transmissions can be mediated
  - Routed, transformed, and converted
- Mediations can be stateful
  - Necessary for an event processing network to perform event correlation

Motivating Example: Airline Flight Delay

- Airline flight is delayed
  - Miss connection(s)?
  - Change rental car reservation?
  - Change hotel reservation?
  - Change meeting attendance?
- Centralized control (SOA)
  - Someone (Airline? Travel agency? Secretary?) must be aware of all
  - Very complex, needs to be rewritten for any new dependencies
- Distributed control (EDA)
  - Dependents of flights and flight itinerary register interest
    - Dependents: Flight itinerary, rental car, hotel, meeting calendar, etc.
  - Airline announces flights, itinerary changes to dependents
  - Dependents react and adjust