SOA and ESB

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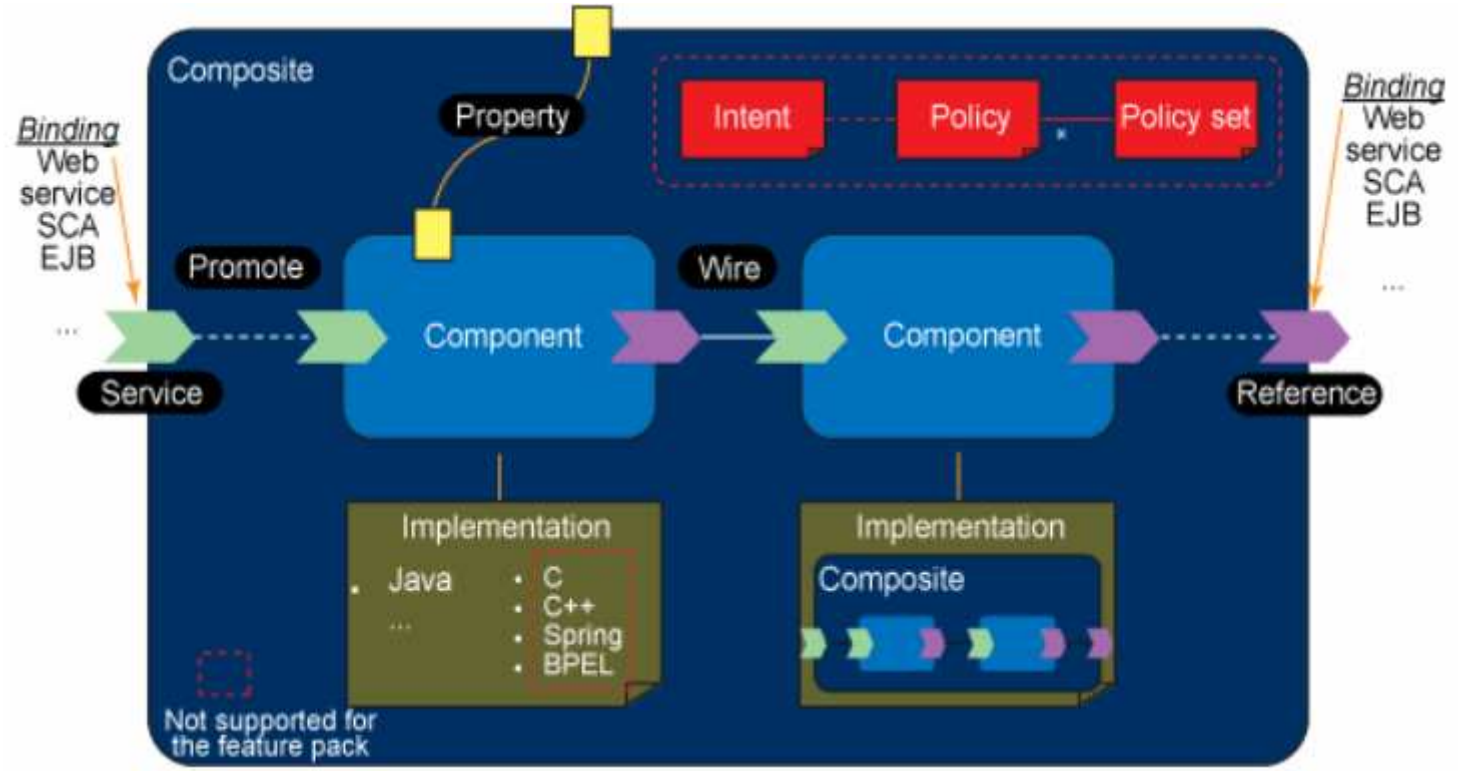
Agenda

- Service Orientation
  - SCA / SDO
- Process Choreography
  - WS-BPEL
- Enterprise Service Bus
- Demonstration
  - WebSphere Integration Developer
  - WebSphere Process Server (and ESB)

SCA

- Service Component Architecture
  - Dependency Injection
  - Version 1.0, March 2007
  - Led by IBM through osoa.org
    - Broad vendor support
  - Platform and Programming Language Independent
  - Reference Implementations
    - Apache Tuscany
  - Standards Managed by OASIS
    - oasis-opencsa.org/specifications
  - 0.9 shipped with WebSphere Process Server 6.0
  - Also WebSphere Application Server 7.0
    - Feature Pack for SCA

Service Component Architecture



SCA - Services

```
public interface ServiceImplSync {
    public Object invoke(OperationType operationType, Object input) throws
    ServiceBusinessException;
}
public interface ServiceImplAsync {
    public void invoke(OperationType operationType, Object input,
    ServiceCallback callback, Ticket ticket);
}
```

```
public interface StockQuote {
     public float getQuote(String symbol) throws InvalidSymbolException;
}
public interface StockQuoteAsync {
     public void getQuoteAsync(String symbol, ServiceCallback callback,
      Ticket ticket);
}
```

SCA - Clients

```
public interface Service {

   public Object invoke(String operationName, Object input) throws
   ServiceBusinessException;

   public Ticket invokeAsync(String operationName, Object input);

   public Ticket invokeAsyncWithCallback(String operationname,
   Object input);

   public Object invokeResponse(Ticket ticket, long timeout)
   throws ServiceBusinessException;

}

public interface ServiceCallback {

   public void onInvokeResponse(Ticket ticket, Object output,
   Exception exception);

}
```

SDO

- Service Data Object
  - At version 2.1, November 2006
  - Evolved from eclipse.org EMF
  - Same standards body as SCA
- Compatible with XML Schema
  - Physical Format Independent
  - Static and Dynamic API
  - Support for disconnected data pattern

SDO API

```
DataGraph graph = db.executeQuery( select * from customer );
DataObject root = graph.getRootObject();

// use xpath to get the name of the first customer
String firstCustName = root.getString( customer[0]/name );

// iterate through all customers (dynamic API)
Iterator iter = root.getList( customer ).iterator();
while (iter.hasNext()) {
   DataObject dataObject = (DataObject) iter.next();
   String custName = dataObject.getString( name );
}

// iterate through all customers (type safe API)
Iterator iter = root.getList( customer ).iterator();
while (iter.hasNext()) {
   Customer customer = (Customer) iter.next();
   String custName = customer.getName();
}
```

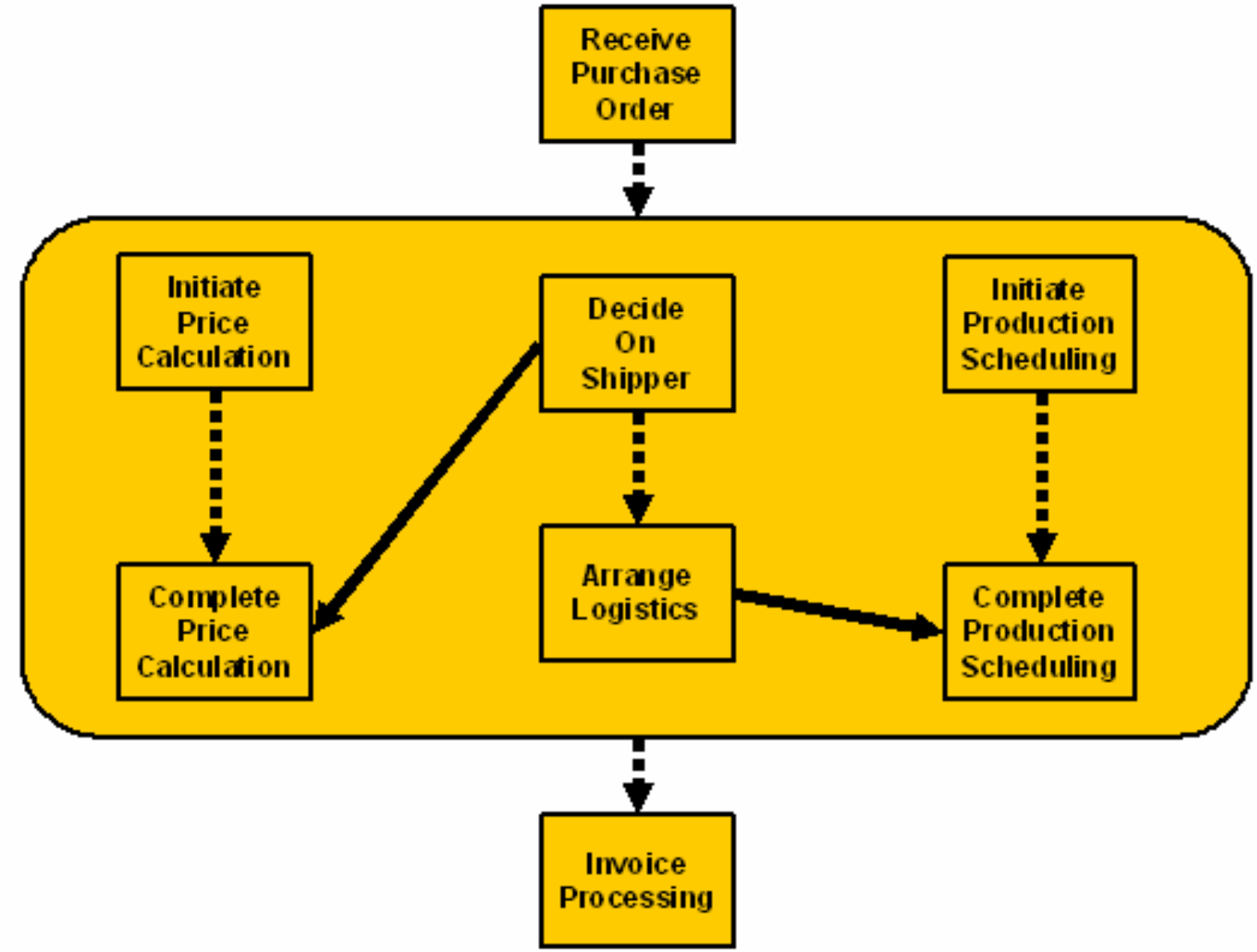
Disconnected Data

```
<sdo:datagraph xmlns:sdo="commonj.sdo">

   <changeSummary>
    <sim:SIMPLE_CUSTOMER
        sdo:ref="#/sdo:datagraph/sim:SIMPLE_CUSTOMER"
        xmlns:sim="ld:logical/SimpleCustomer">
     <CUSTOMER_SINCE>1999-01-01T00:00:00</CUSTOMER_SINCE>
    </sim:SIMPLE_CUSTOMER>
   </changeSummary>

   <sim:SIMPLE_CUSTOMER xmlns:sim="ld:logical/SimpleCustomer">
    <CUSTOMER_ID>CUSTOMER7</CUSTOMER_ID>
    <CUSTOMER_SINCE>2007-11-11T00:00:00</CUSTOMER_SINCE>
   </sim:SIMPLE_CUSTOMER>

</sdo:datagraph>
```

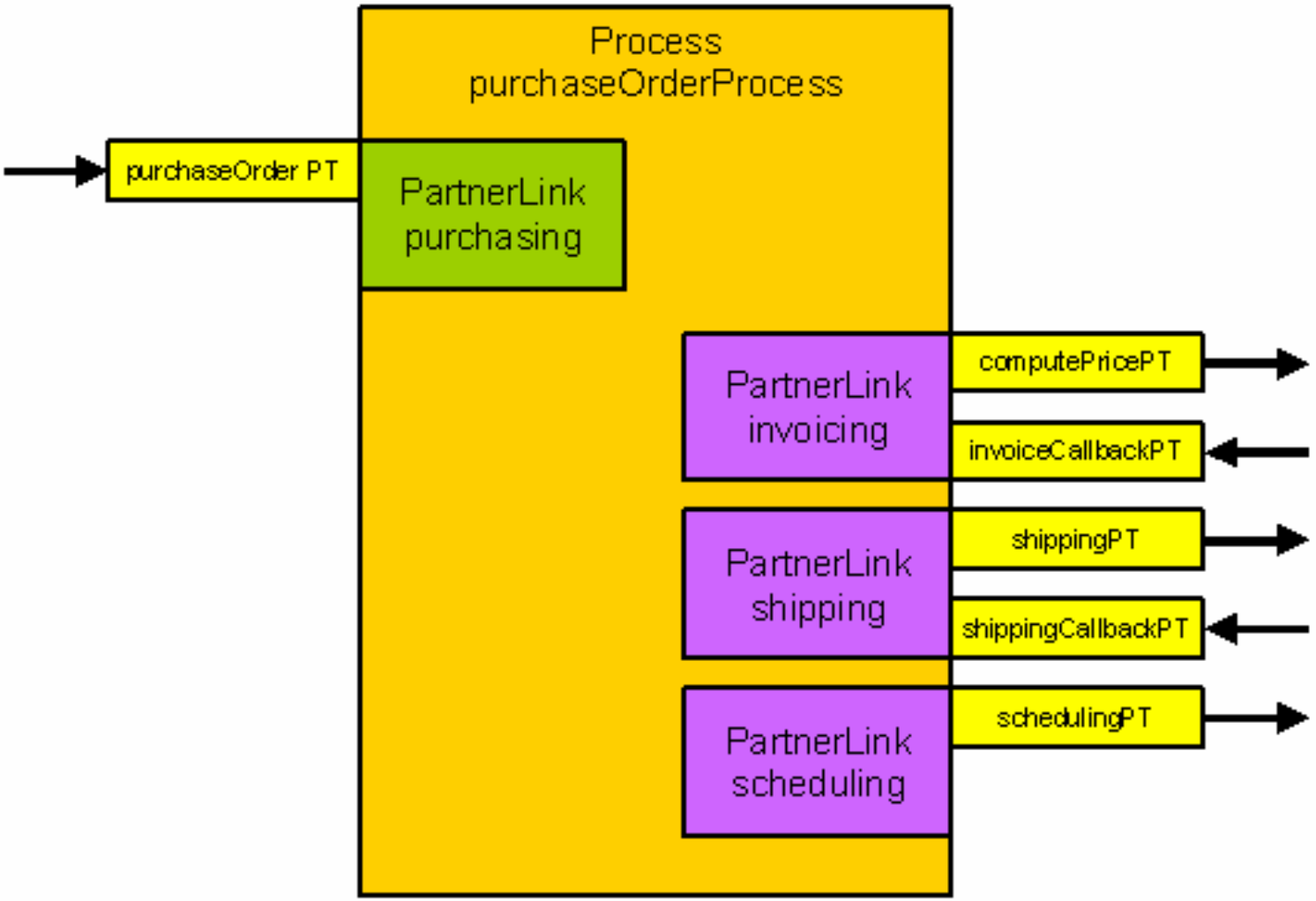
WS-BPEL

- Business Process Execution Language
  - WS-BPEL 2.0, April 2007
  - Evolved from BPEL4WS 1.1 May 2003
  - Managed by oasis-open.org
- Designed for interoperability via
  - WSDL
  - XPath (optional)
- Sequential Processing Construct
  - Activities; Basic and Structured
  - Protocol Neutral
  - No formal details for runtime QoS
- Related Standards
  - BPMN, XPDL

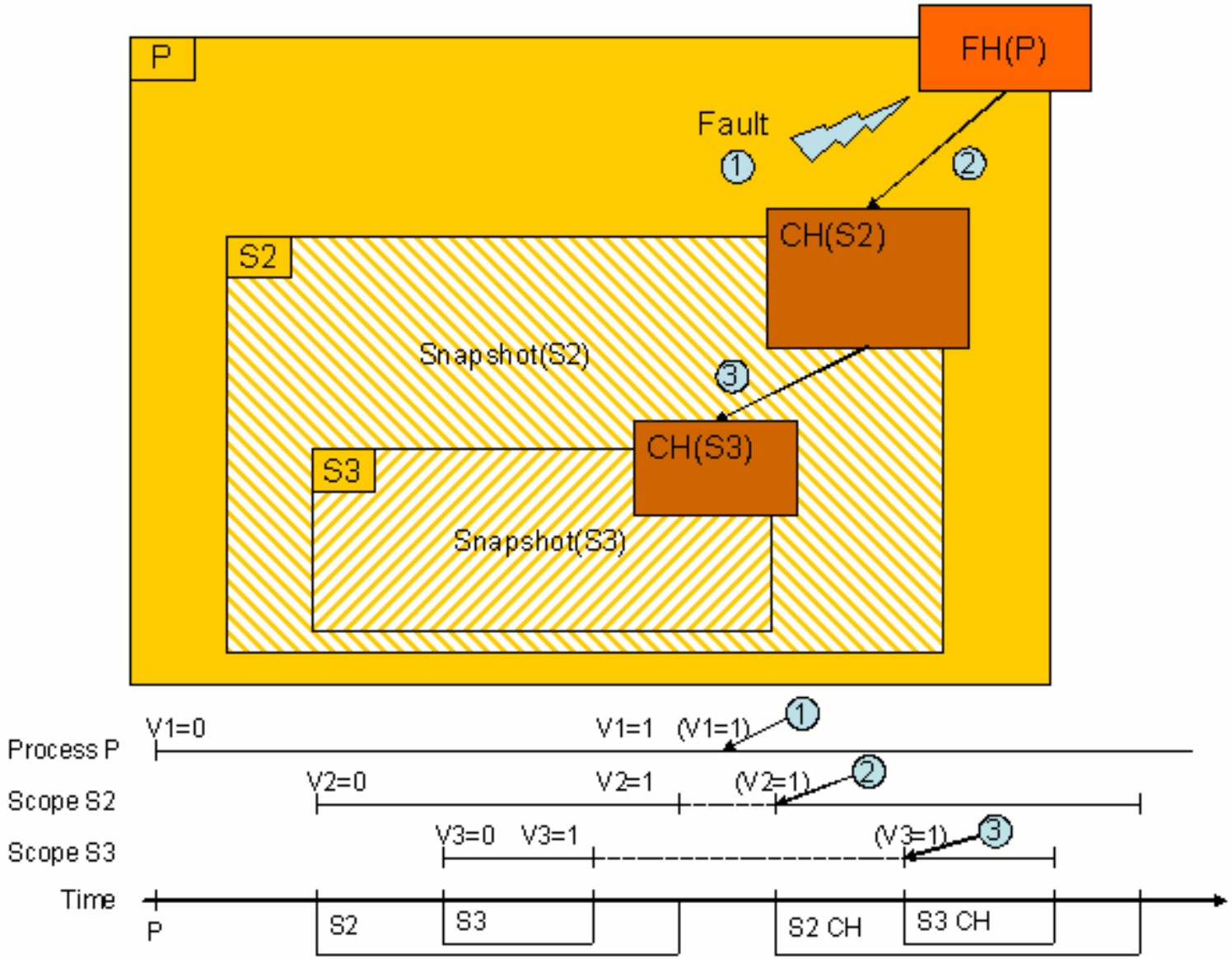
WS-BPEL - Activities



WS-BPEL - PartnerLinks



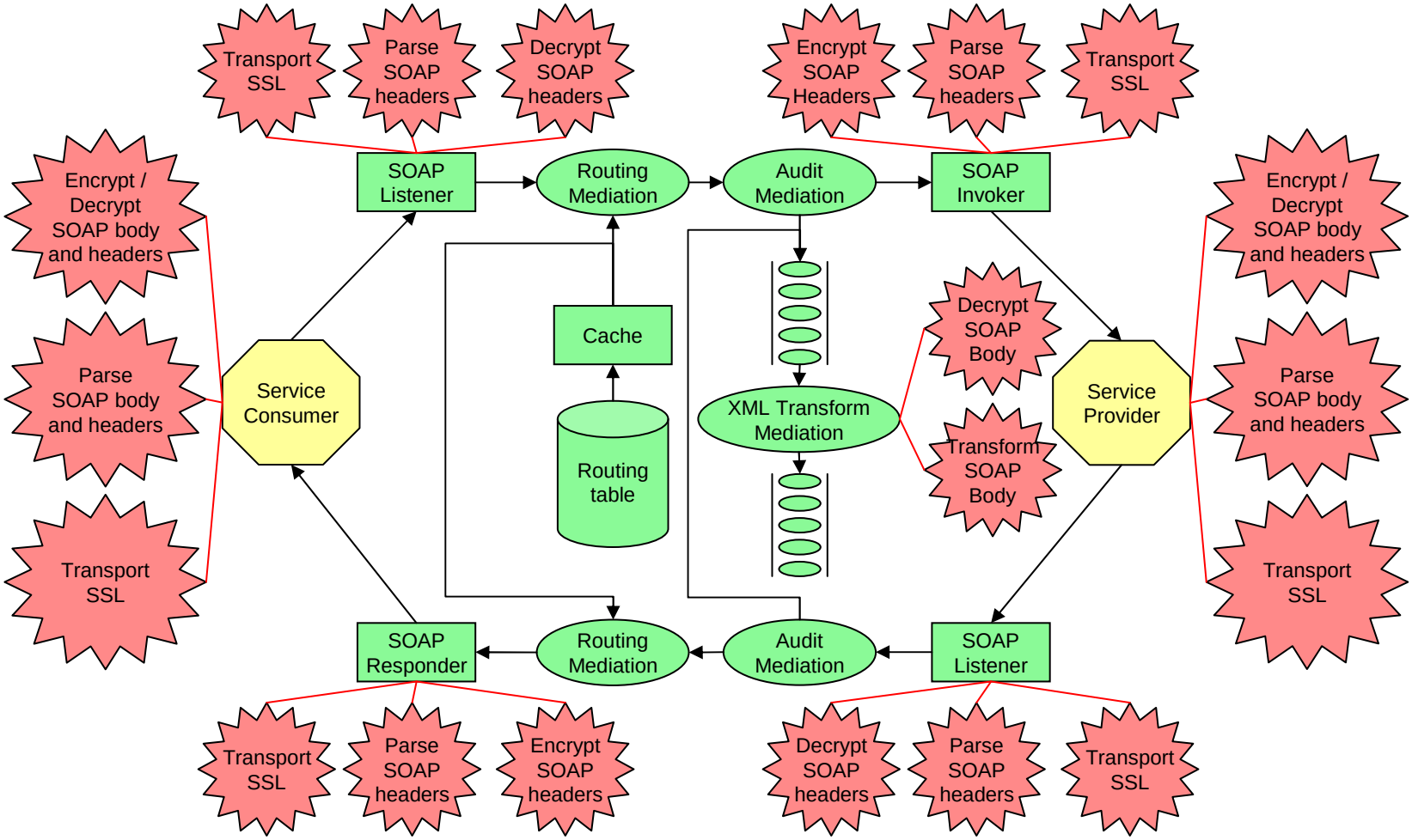
Scopes, Faults, Compensation



ESB

- Enterprise Service Bus
  - Common architectural pattern used in Integration solutions
  - Origin in Messaging Middleware, e.g.
    - WebSphere Message Broker
    - WebSphere ESB
    - WebSphere Datapower
  - Flow composition based on primitives
    - e.g. XSLT, Map, Java, Property Setters
    - Protocol Management Tier
  - Manage
    - Interaction Patterns
    - Type Conversion
    - Physical Format
    - Transport Protocol

Counting the Cost of SOA



Demonstration

- WebSphere Integration Developer
  - To Demonstrate and Discuss
  - SCA Solution Assembly
  - SCA Export / Import Bindings
  - QoS Options (SCA & BPEL)
  - WS-AtomicTransaction in 2PC

Summary

- We have covered
  - Programming Models
    - SCA / SDO
    - WS-BPEL
    - ESB
  - Demonstration of
    - WebSphere Integration Developer for
    - WebSphere Process Server and
    - WebSphere ESB

Questions?

References

- WS-BPEL Specification, version 2.0, OASIS
  - http://docs.oasis-open.org/wsbpel/2.0/OS/wsbpel-v2.0-OS.html
- Service Component Architecture (SCA), OASIS
  - http://www.oasis-opencsa.org/sca
- Apache Tuscany
  - http://tuscany.apache.org/home.html
- IBM developerWorks, SOA and Web Services
  - http://www.ibm.com/developerworks/webservices
- Business Process Modeling Notation (BPMN), version 1.2, OMG
  - http://www.omg.org/docs/formal/09-01-03.pdf
- XML Process Definition Language (XPDL), version 2.1, WfMC
  - http://www.wfmc.org/xpdl.html

Backup …