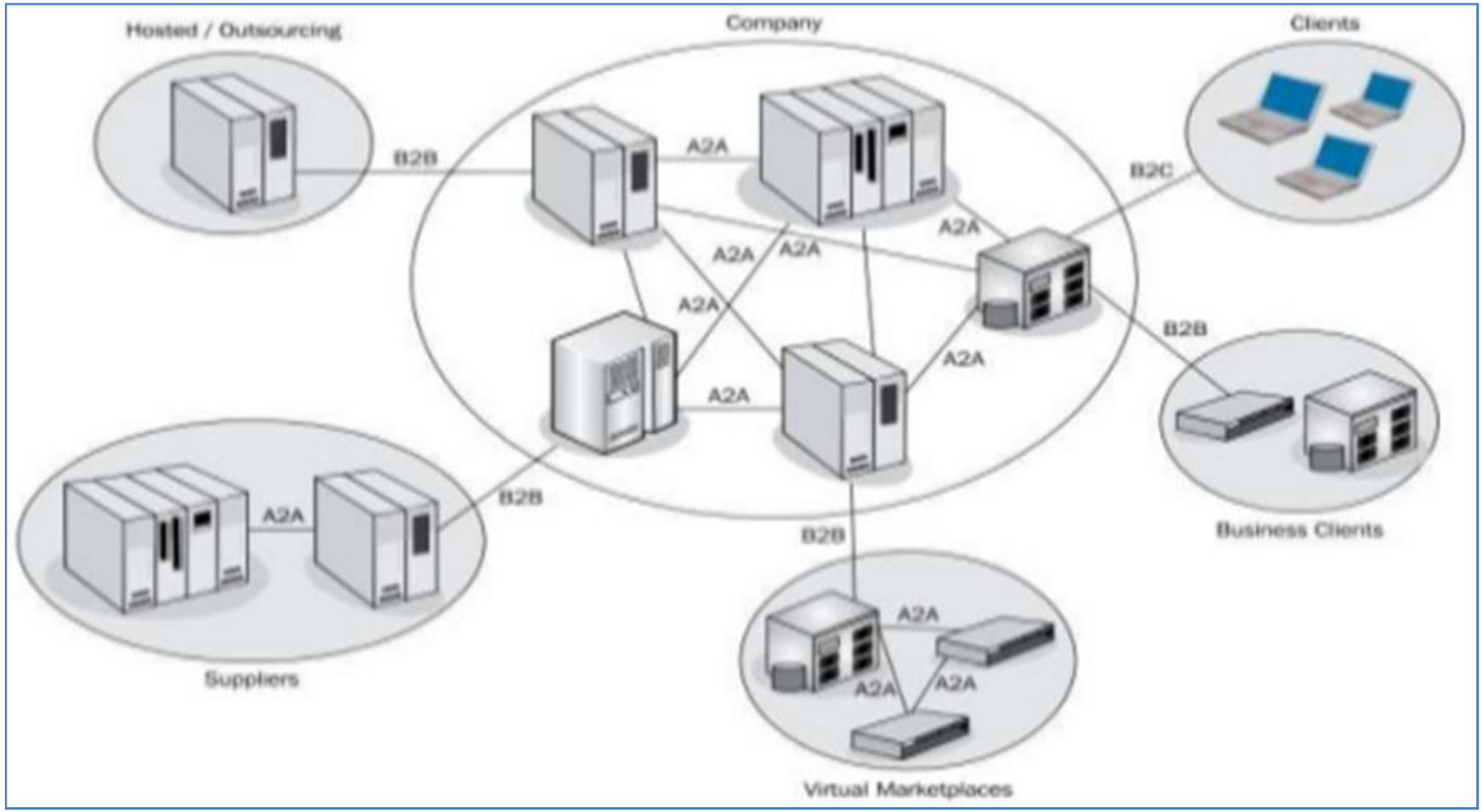
INTRODUCTION TO

ENTERPRISE INTEGRATION PATTERNS

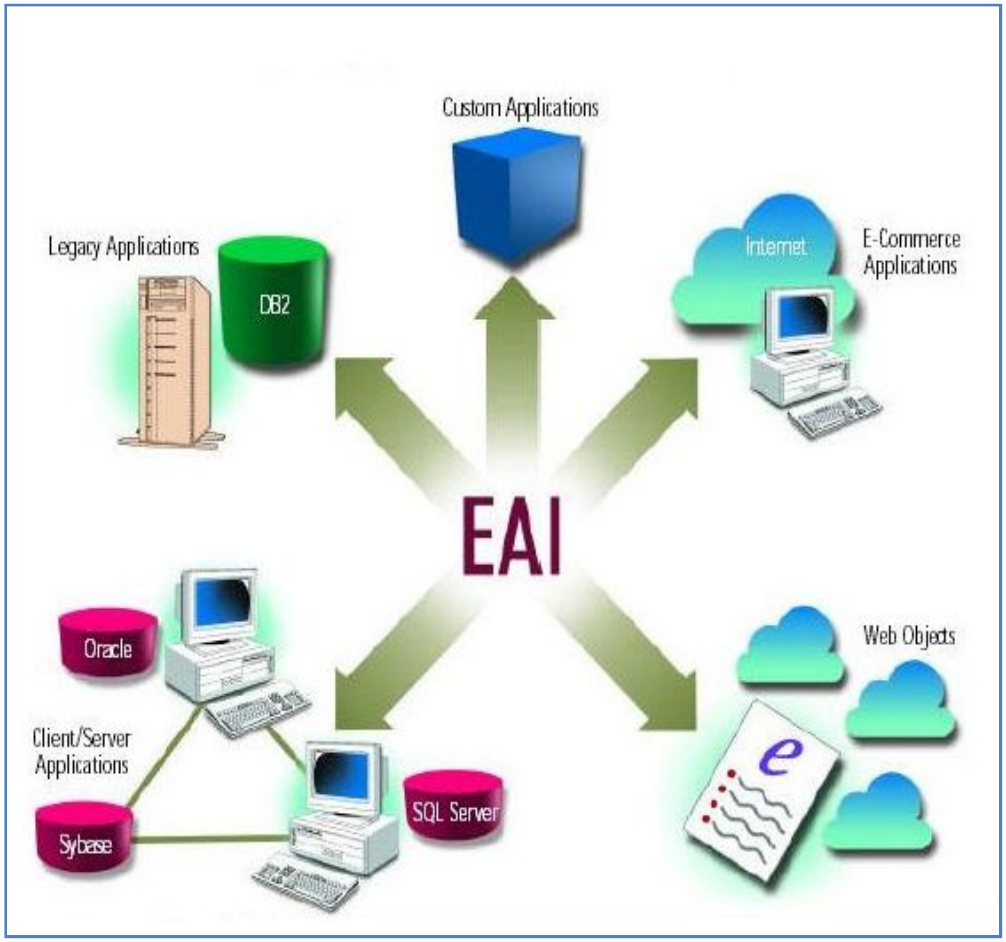
Outline

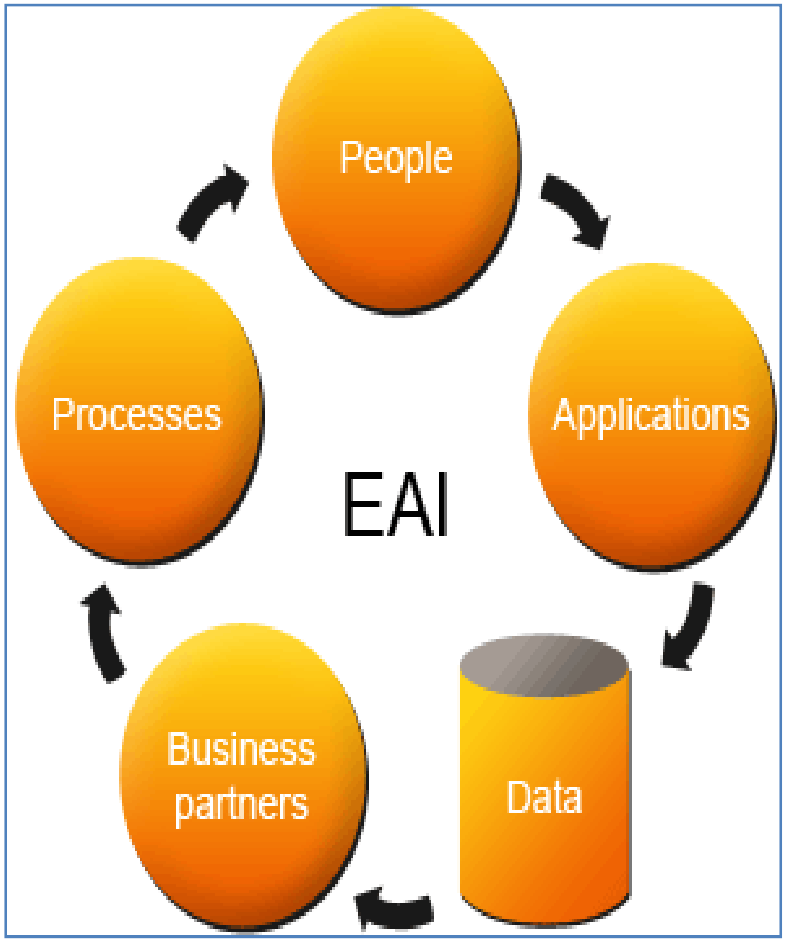
- Enterprise Integration Overview
- Evolution of Integration Solutions
- Integration Styles
- Messaging and Messaging System Overview
- Key Enterprise Integration Patterns
- Example

Enterprise Integration Overview

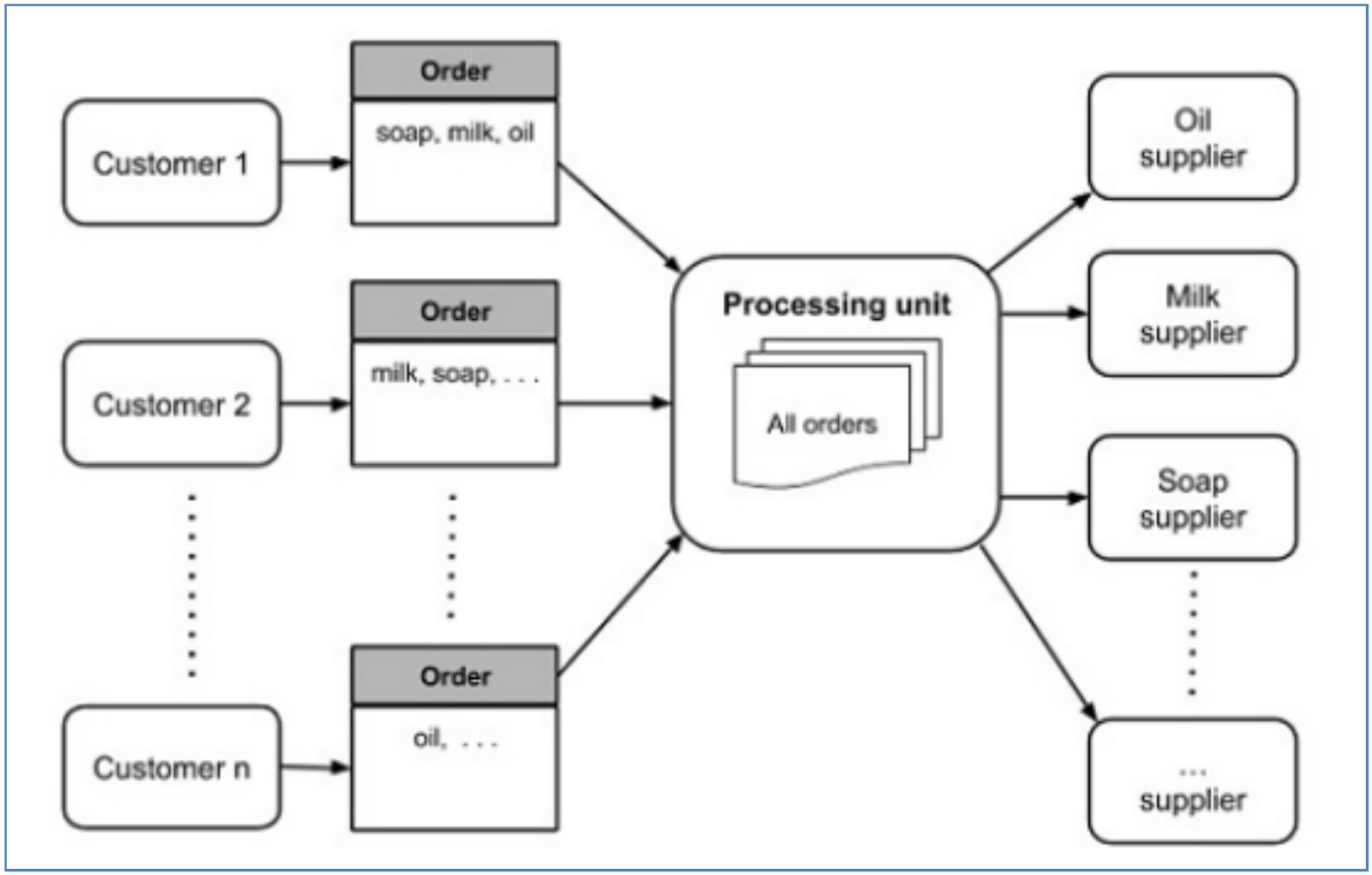


Enterprise Integration Overview (contd.)





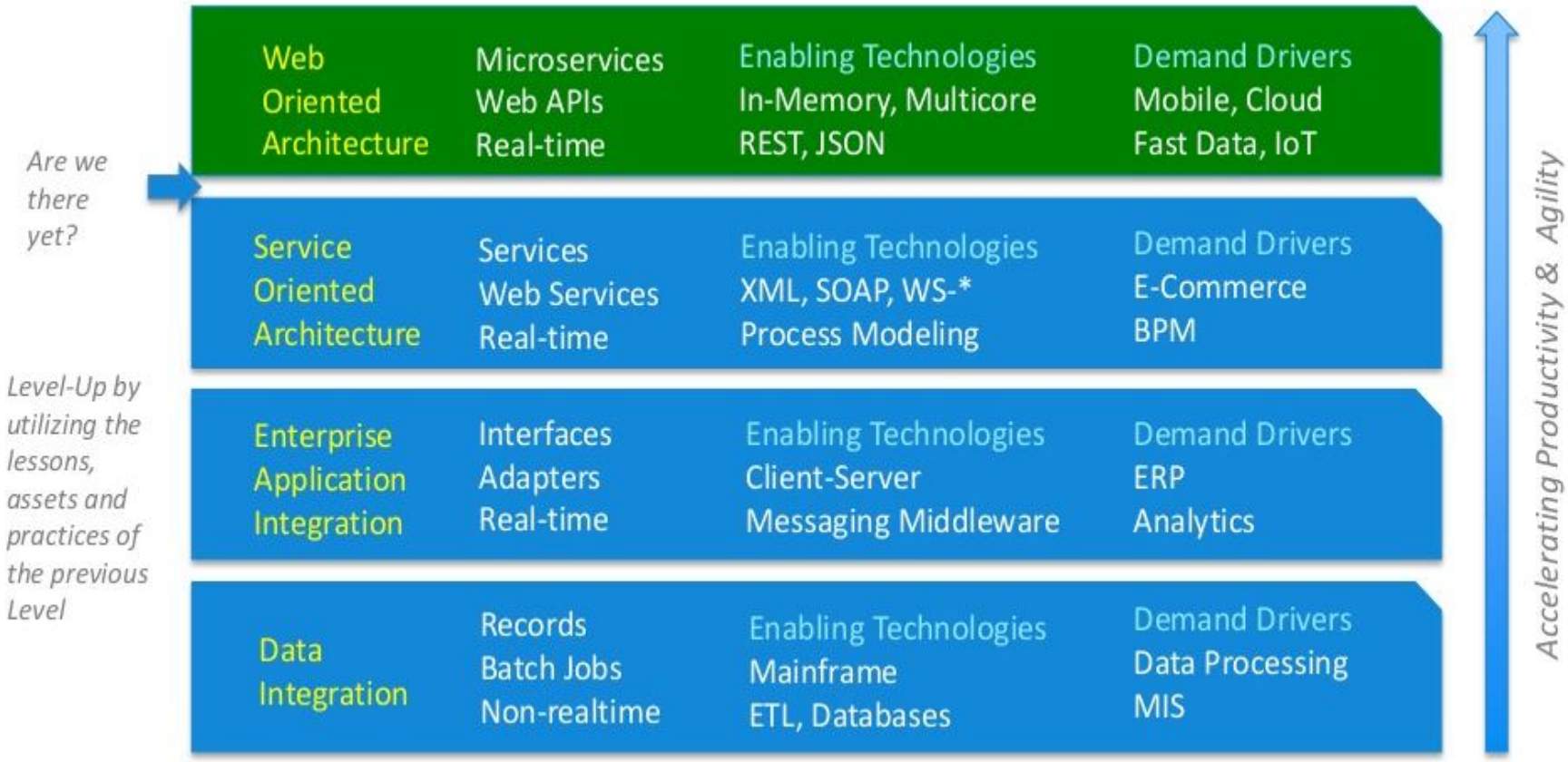
Integration Casestudy: Online Grocery Store



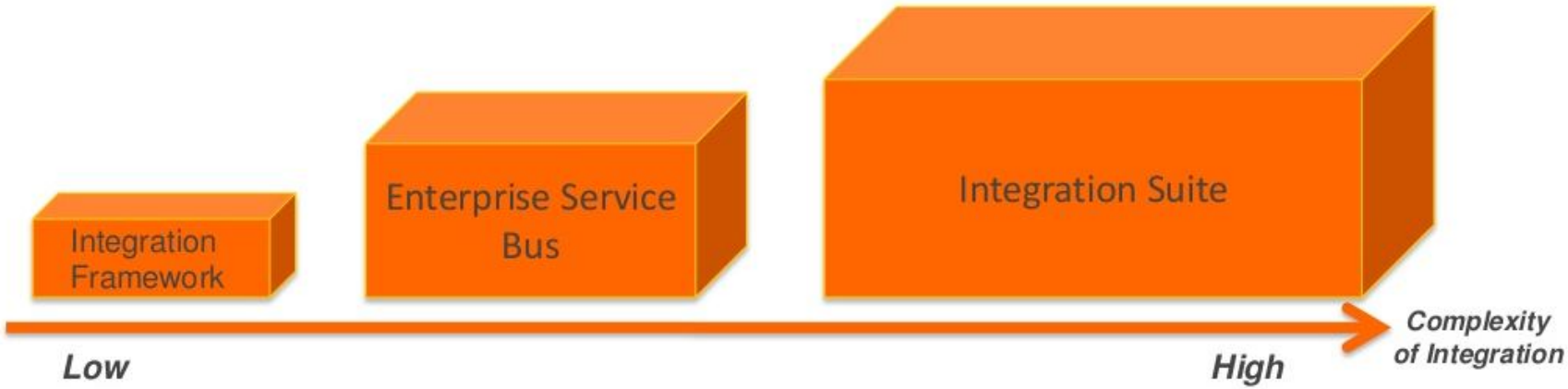
Enterprise Integration Solution Challenges

- Inherently large-scale and complex
- Underlying paradigm different from object-oriented app. development
- Limited control over entities / applications
- Spans many levels of abstraction
- Far-reaching implications, business critical
- Intertwined with corporate politics
- Few standards exist, still evolving

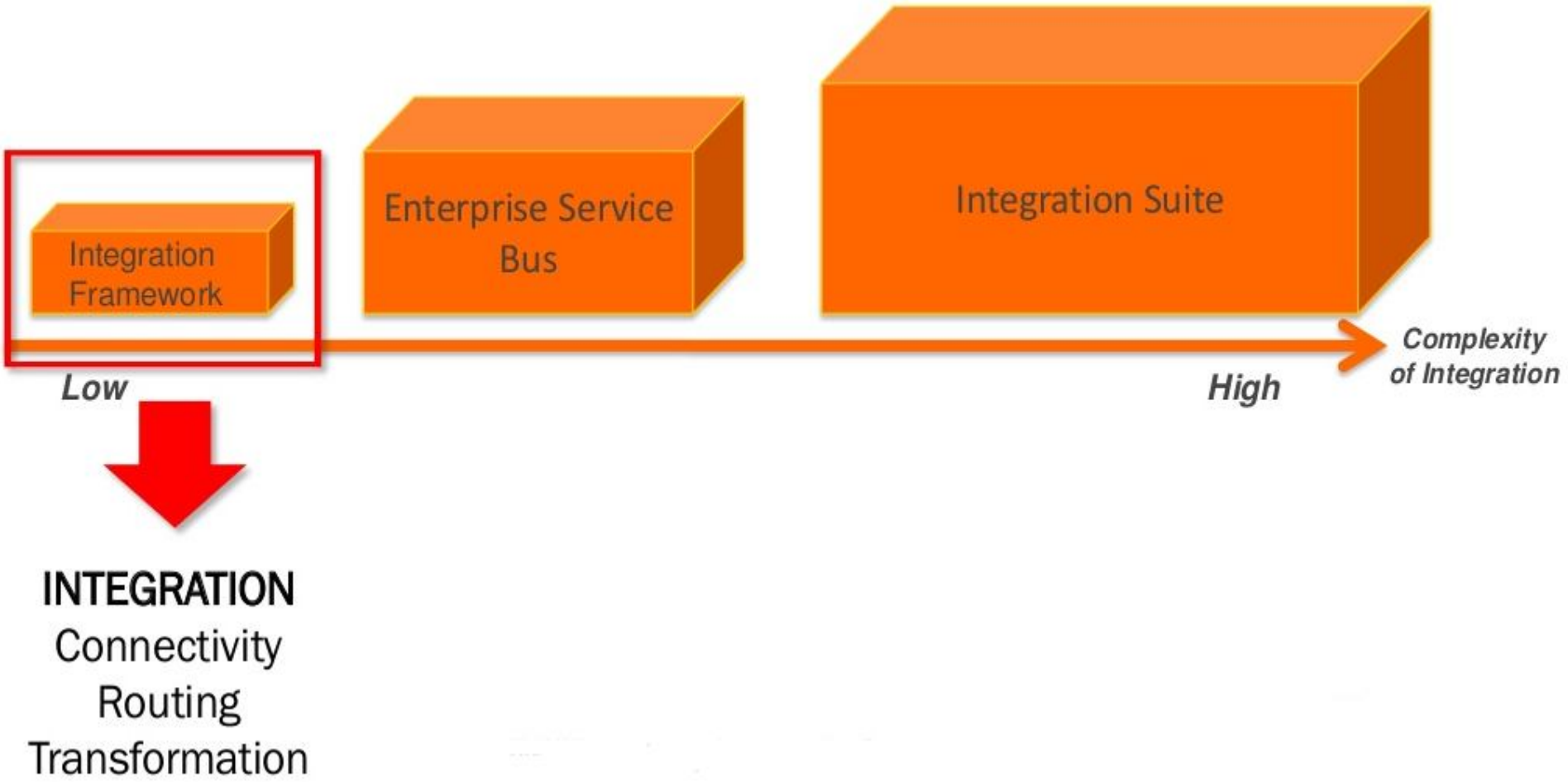
Evolution of Integration



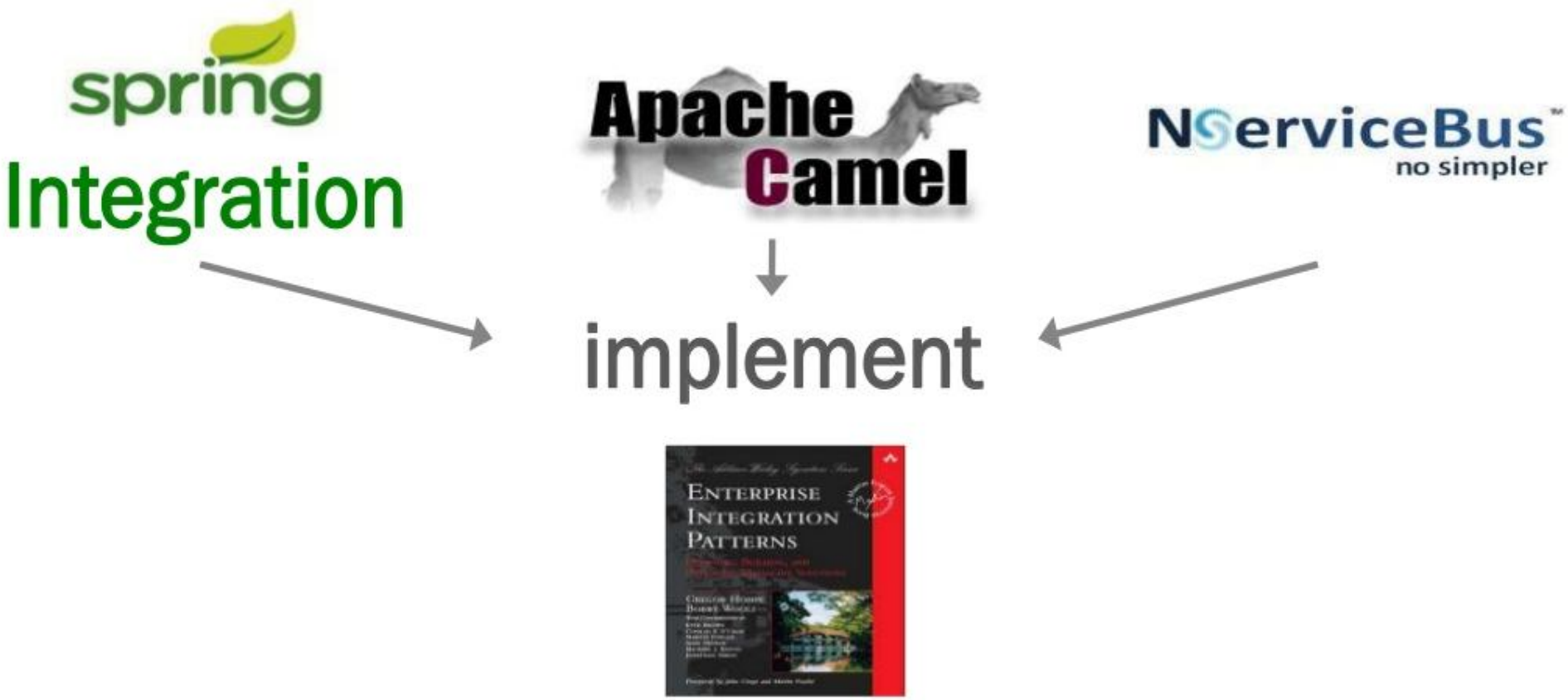
Integration Stack



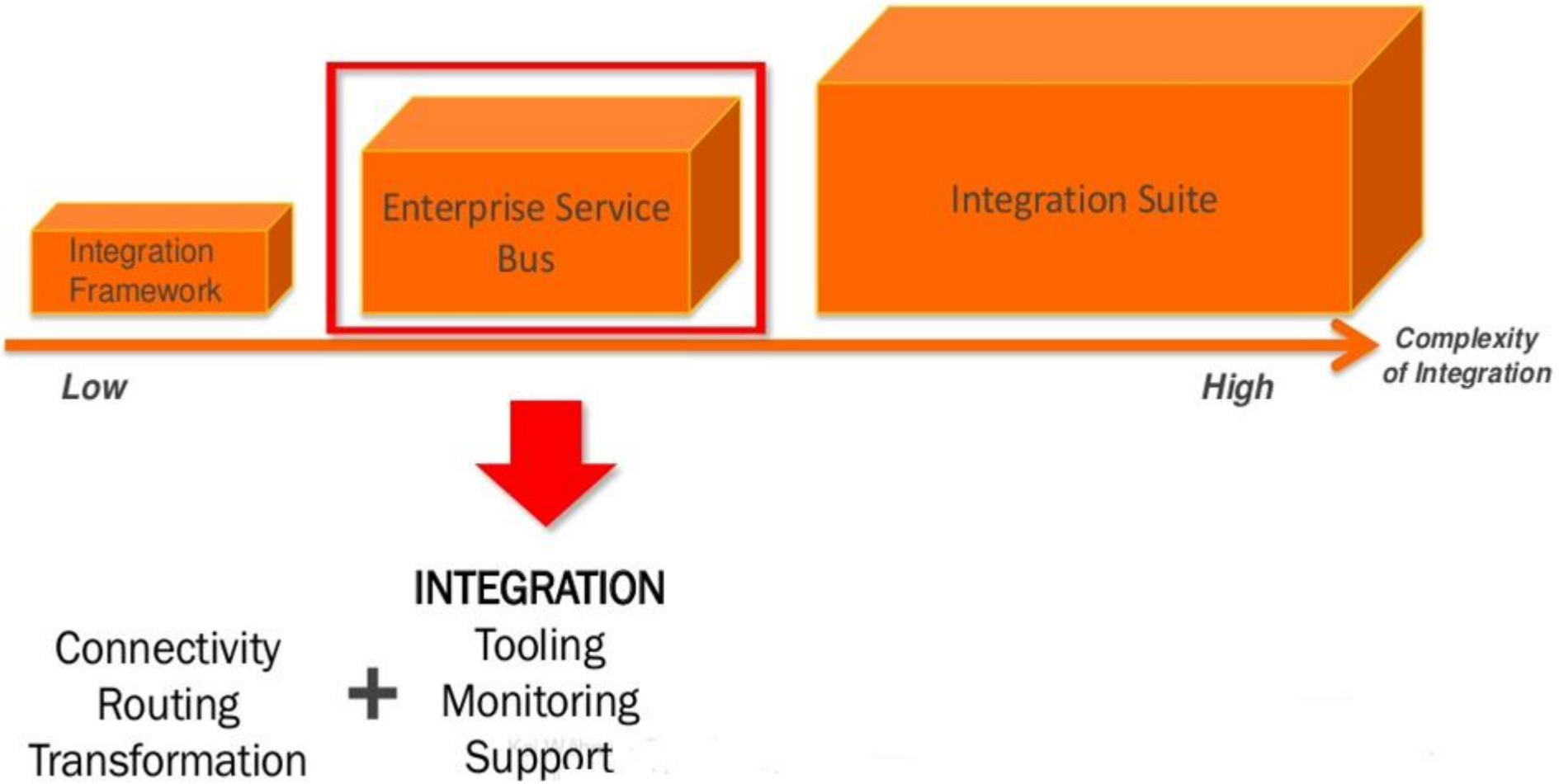
When to go for Integration Framework?



Popular Integration Frameworks

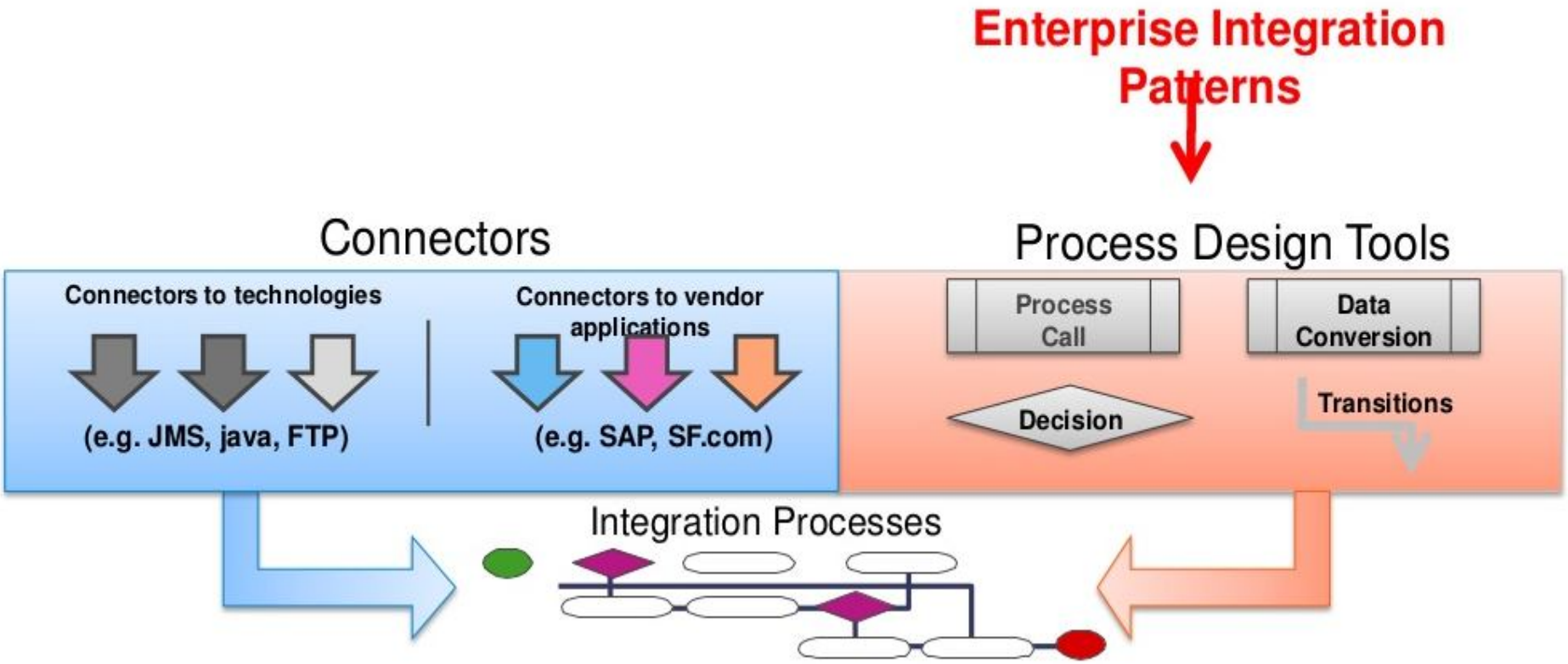


When to go for Enterprise Service Bus?



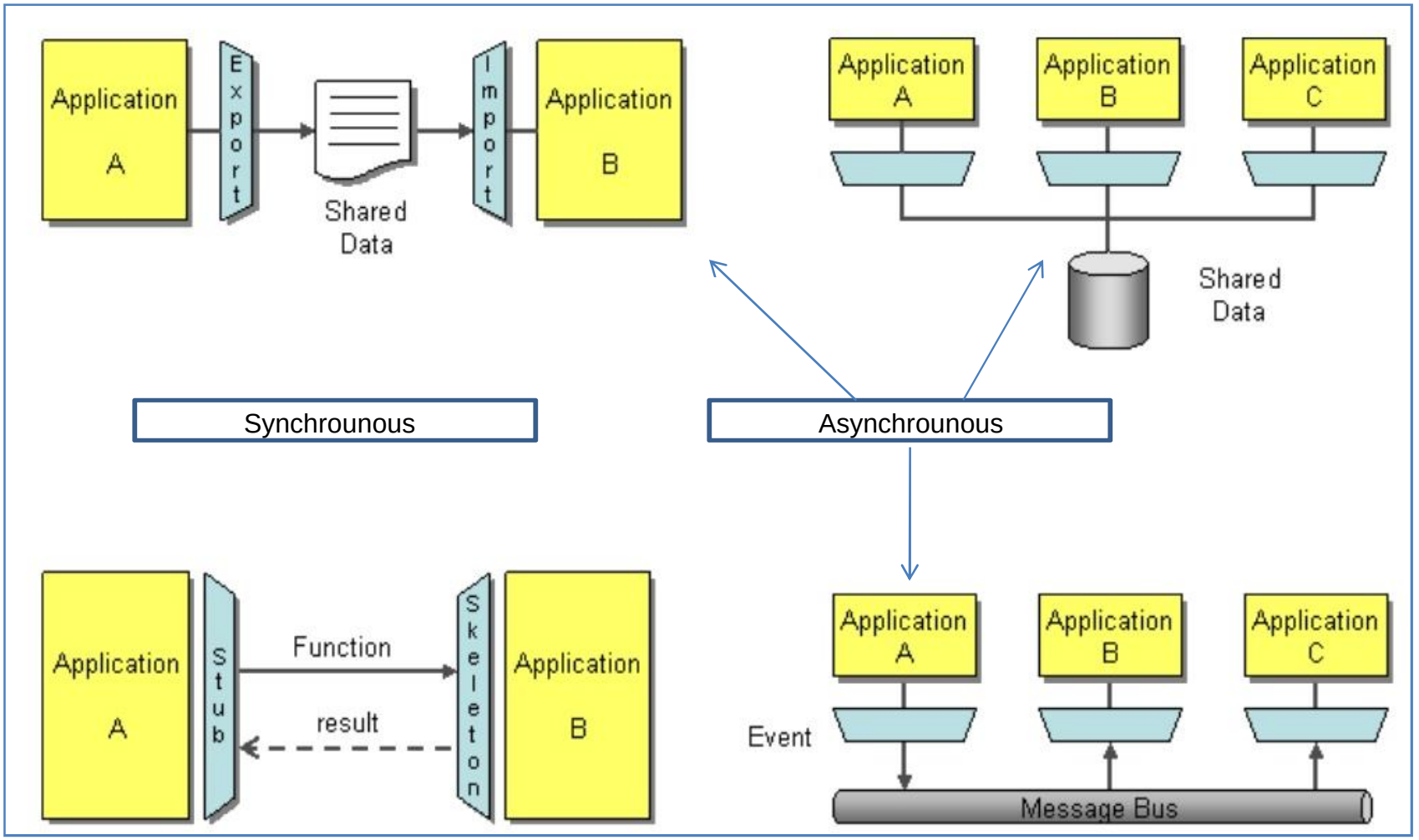
Enterprise Service Bus (ESB)

Enterprise Service Bus (ESB)



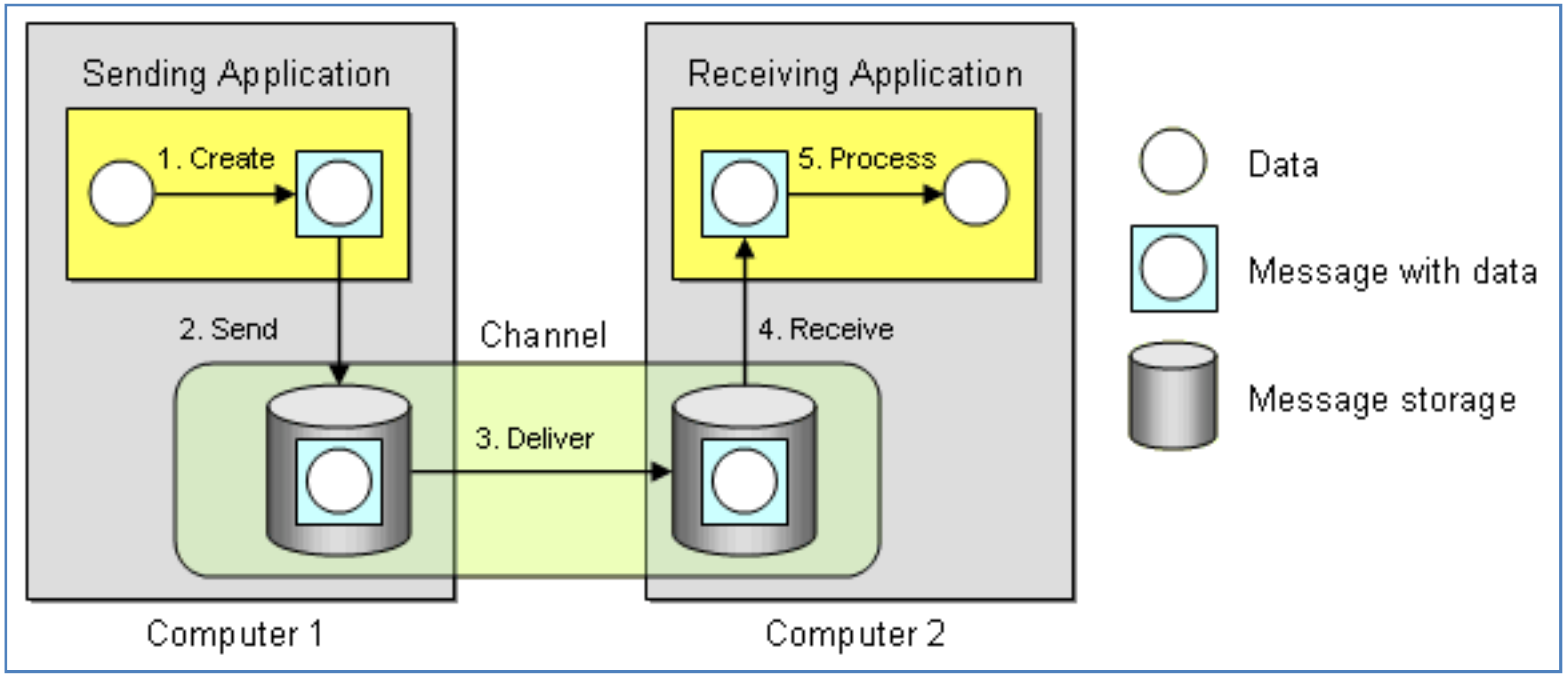
Popular ESB Vendors

Integration Styles / Synchronous vs Asynchrounous



Messaging and Messaging System

- *Messaging* is a technology that enables high-speed, asynchronous, program-to-program communication with reliable delivery
- *Messaging System* or *Message-oriented Middleware (MOM)* provides and manages messaging capabilities



Messaging – Advantages and Challenges

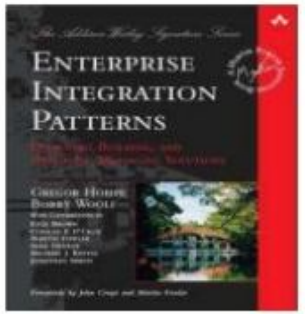
- Remote Communication
- Platform/Language Integration
- Asynchronous Communication
- Variable Timing
- Throttling
- Reliable Communication
- Disconnected Operation
- Mediation
- Thread Management

- Complex programming model
- Sequence Issues
- Synchronous scenarios
- Performance
- Limited platform support
- Vendor lock-in

Enterprise Integration Patterns (EIP)

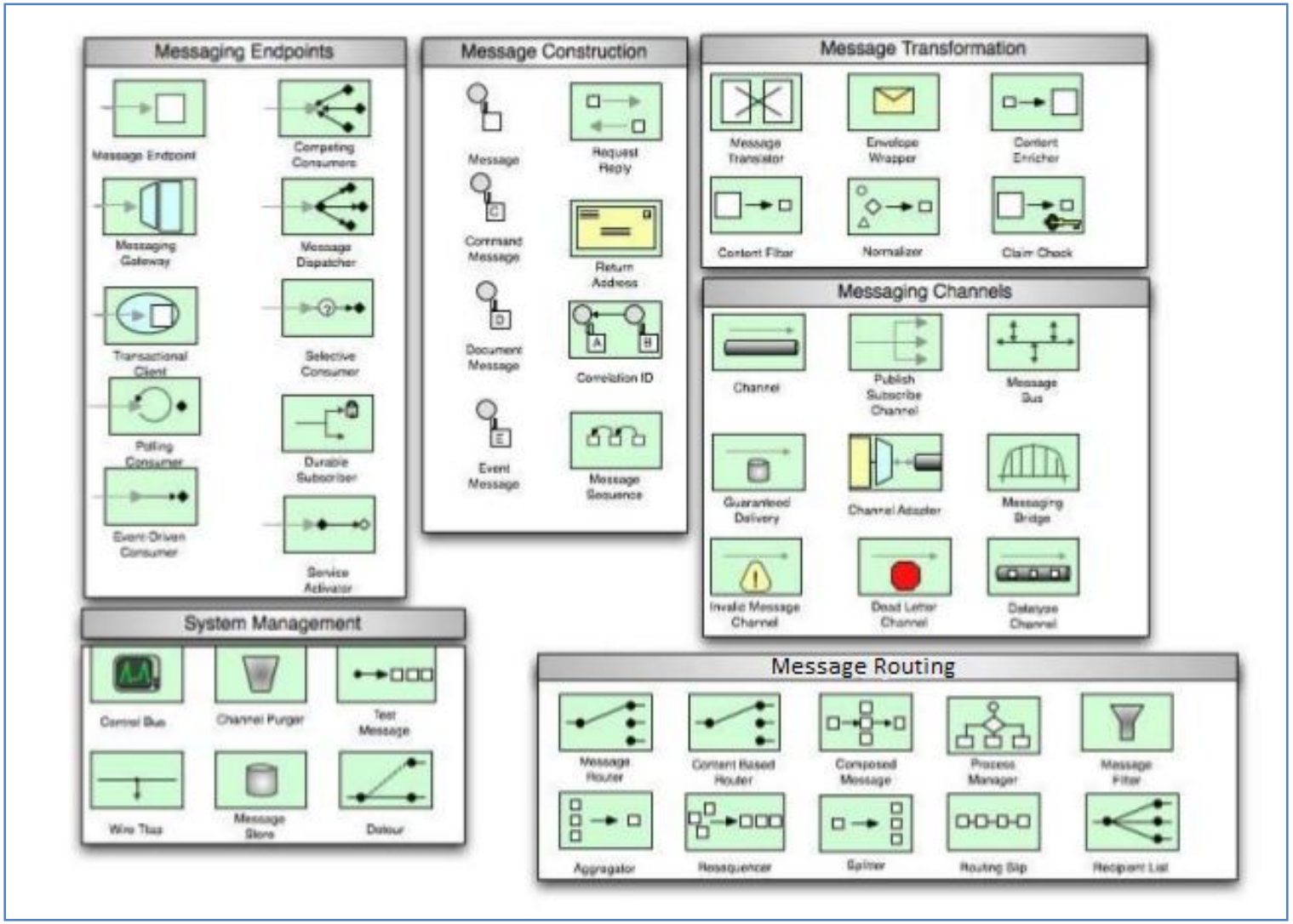
"The goal of EIPs is to document technology-independent design guidance that helps developers and architects describe and develop robust integration solutions."

http://www.eaipatterns.com

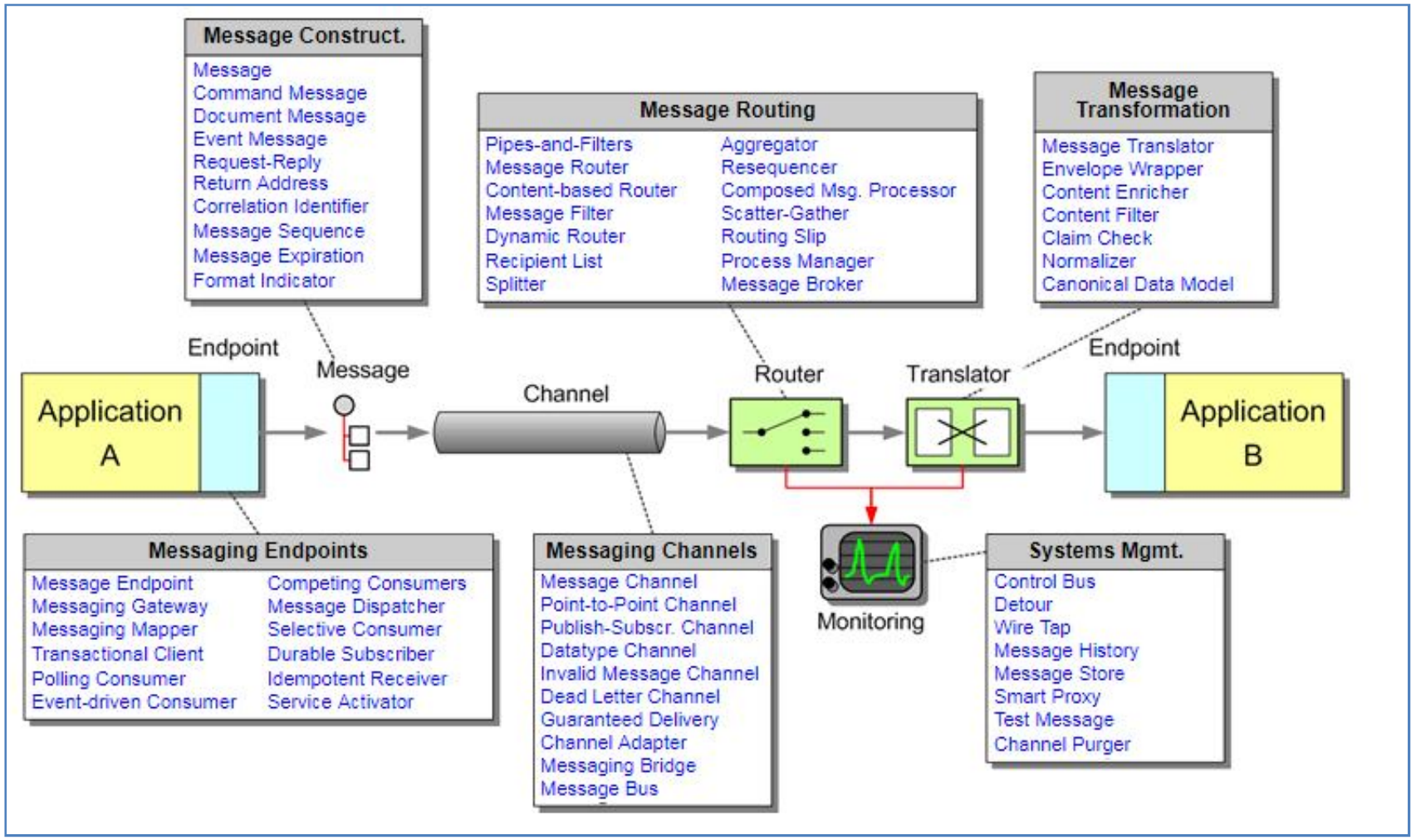


by Gregor Hohpe and Booby Woolf

Enterprise Integration Patterns



Enterprise Integration Patterns Organization

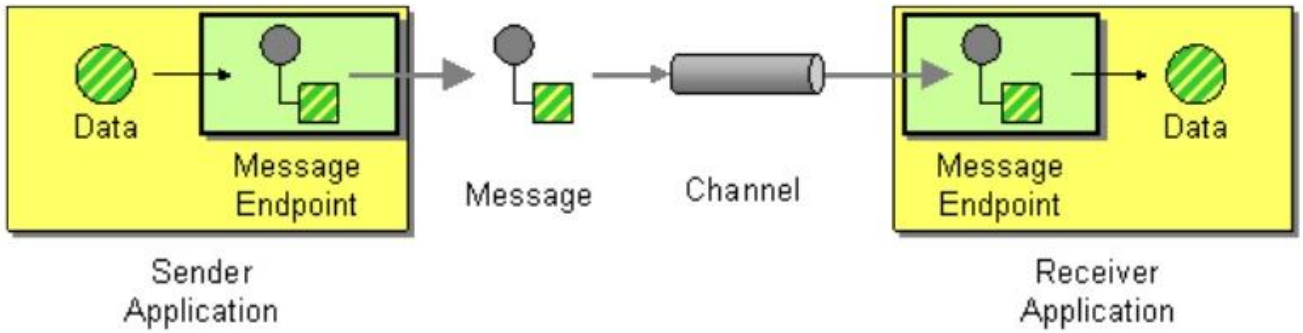


Key Patterns

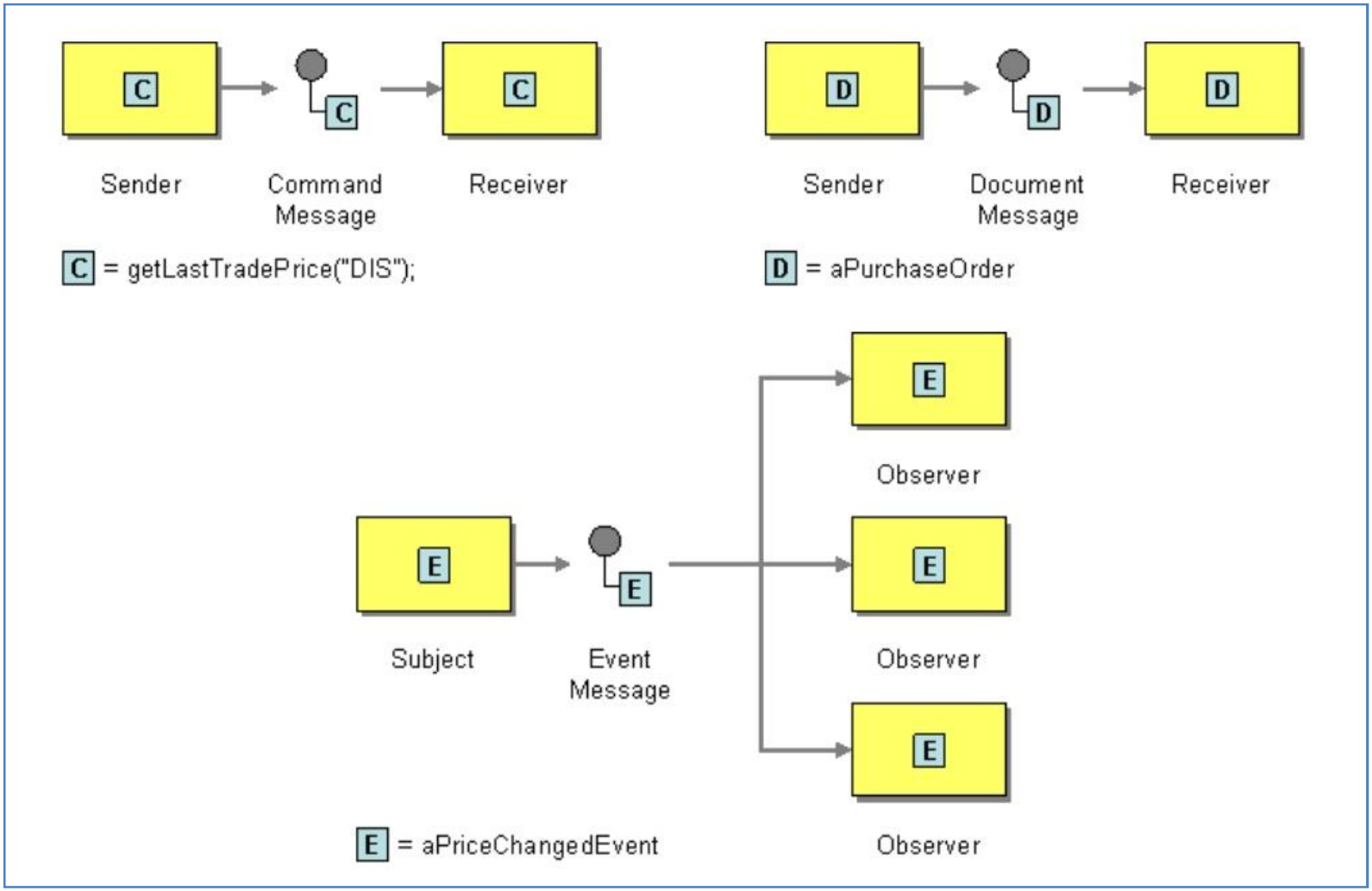
Messaging

Main building blocks:

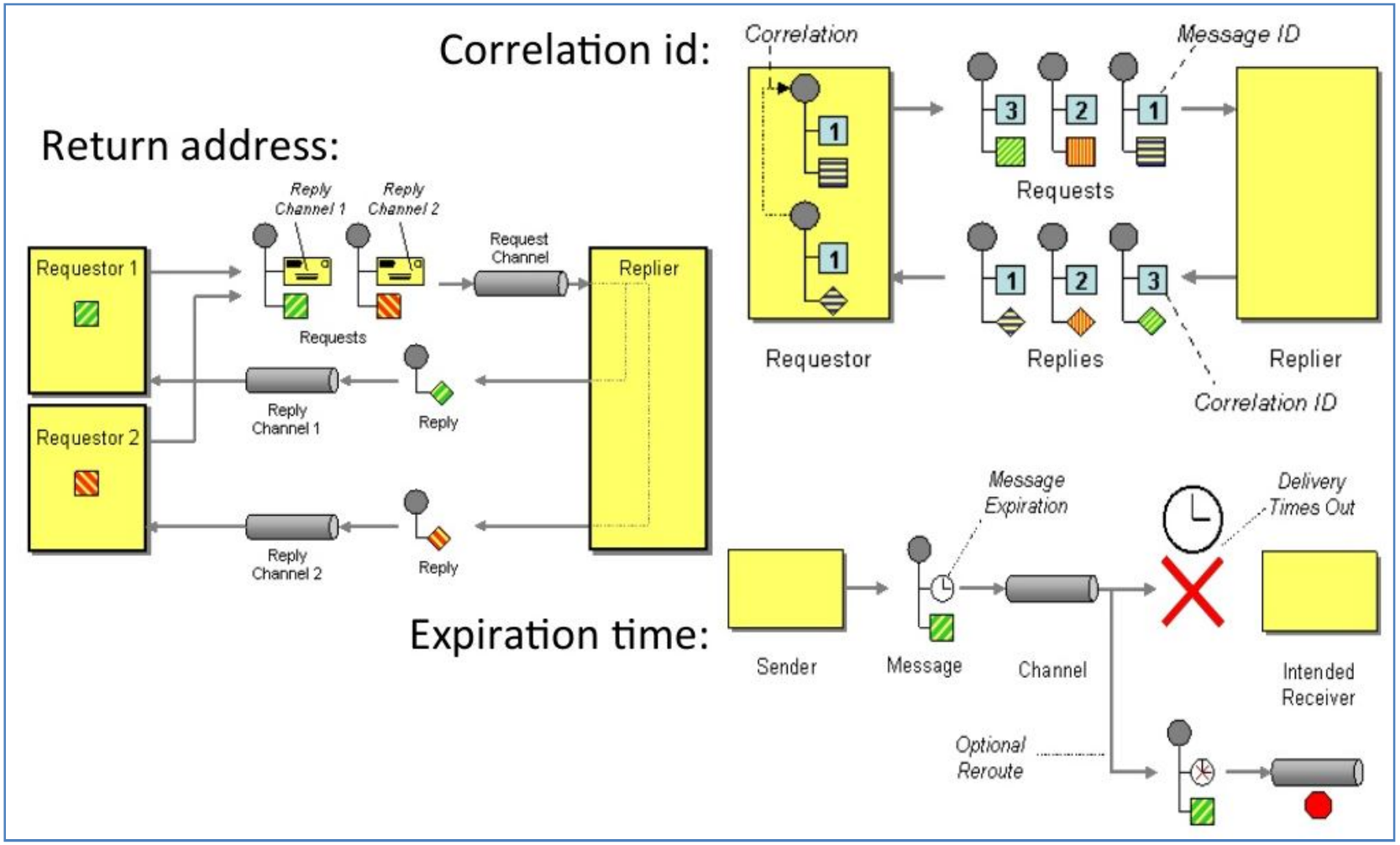
- Endpoint
- Channel
- Message



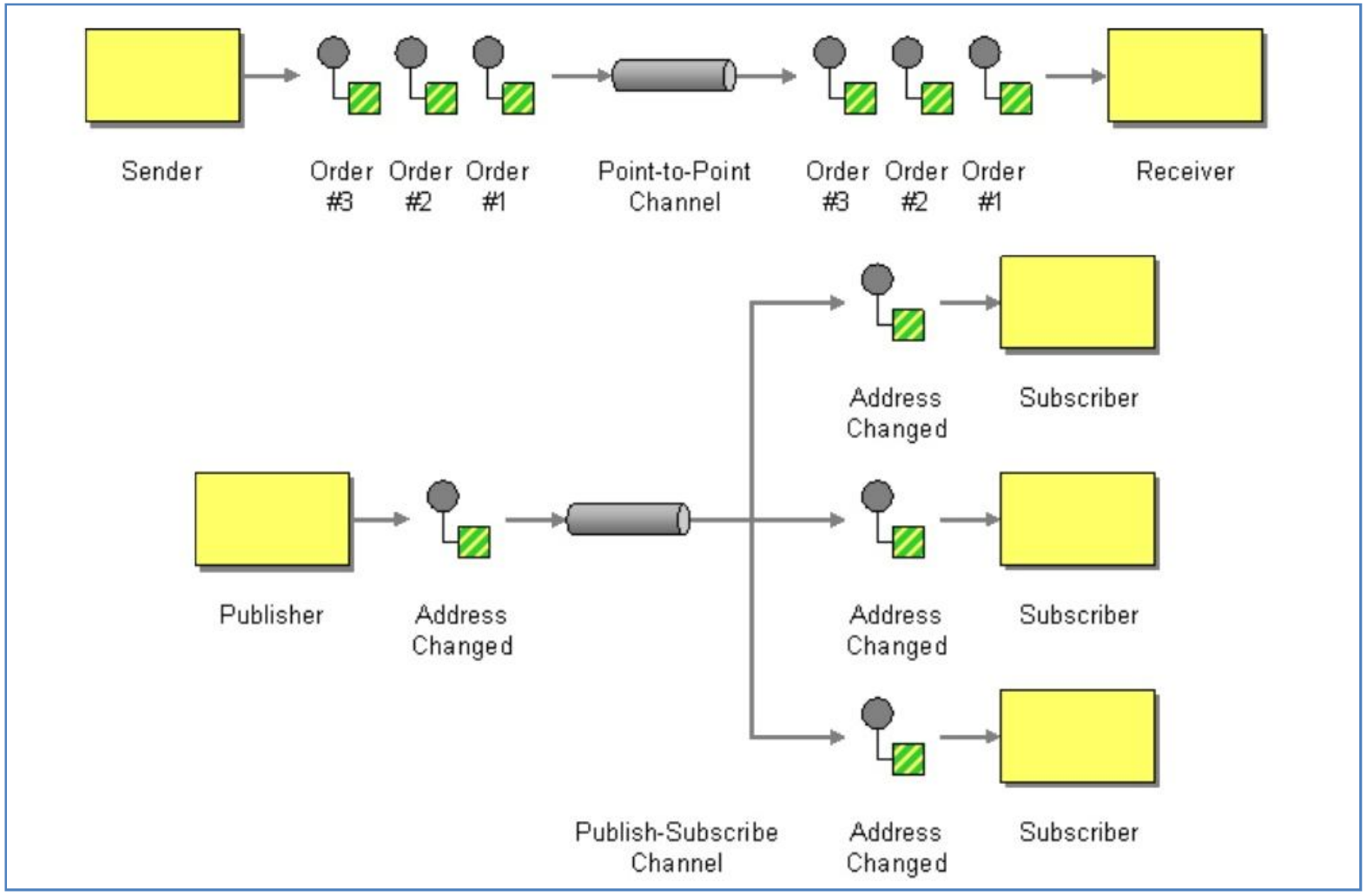
Message Types



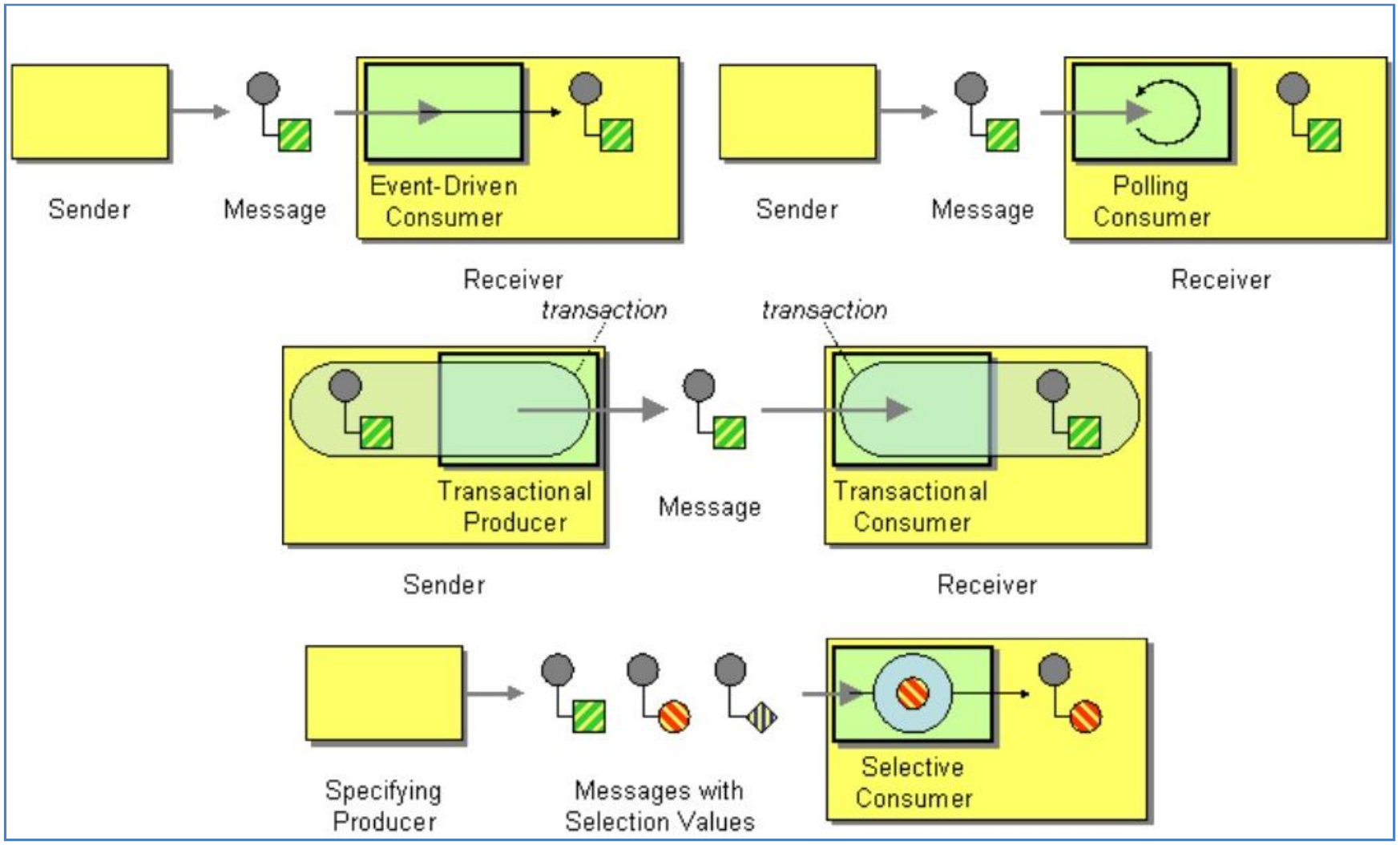
Message Attributes



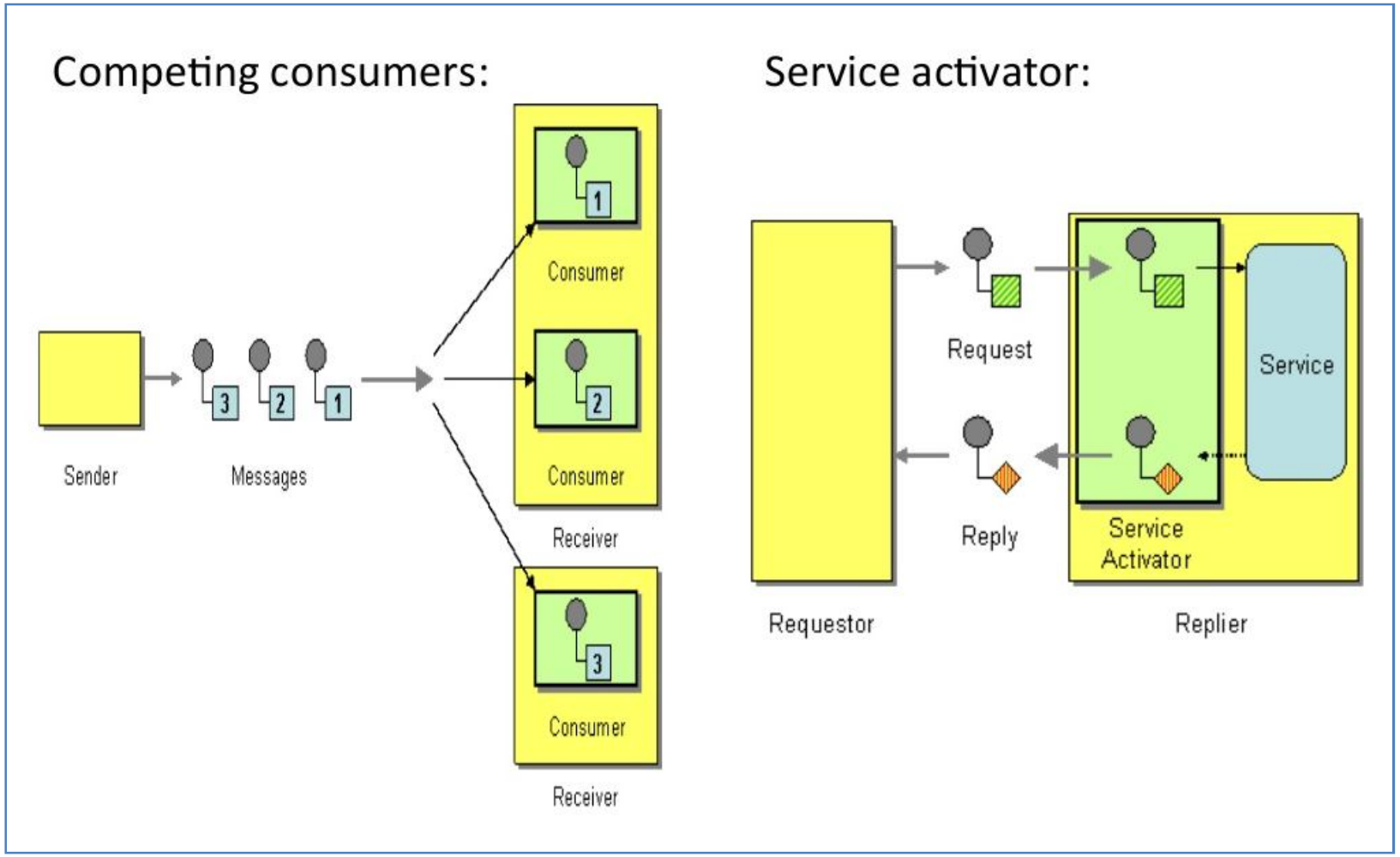
Main Message Exchange Styles



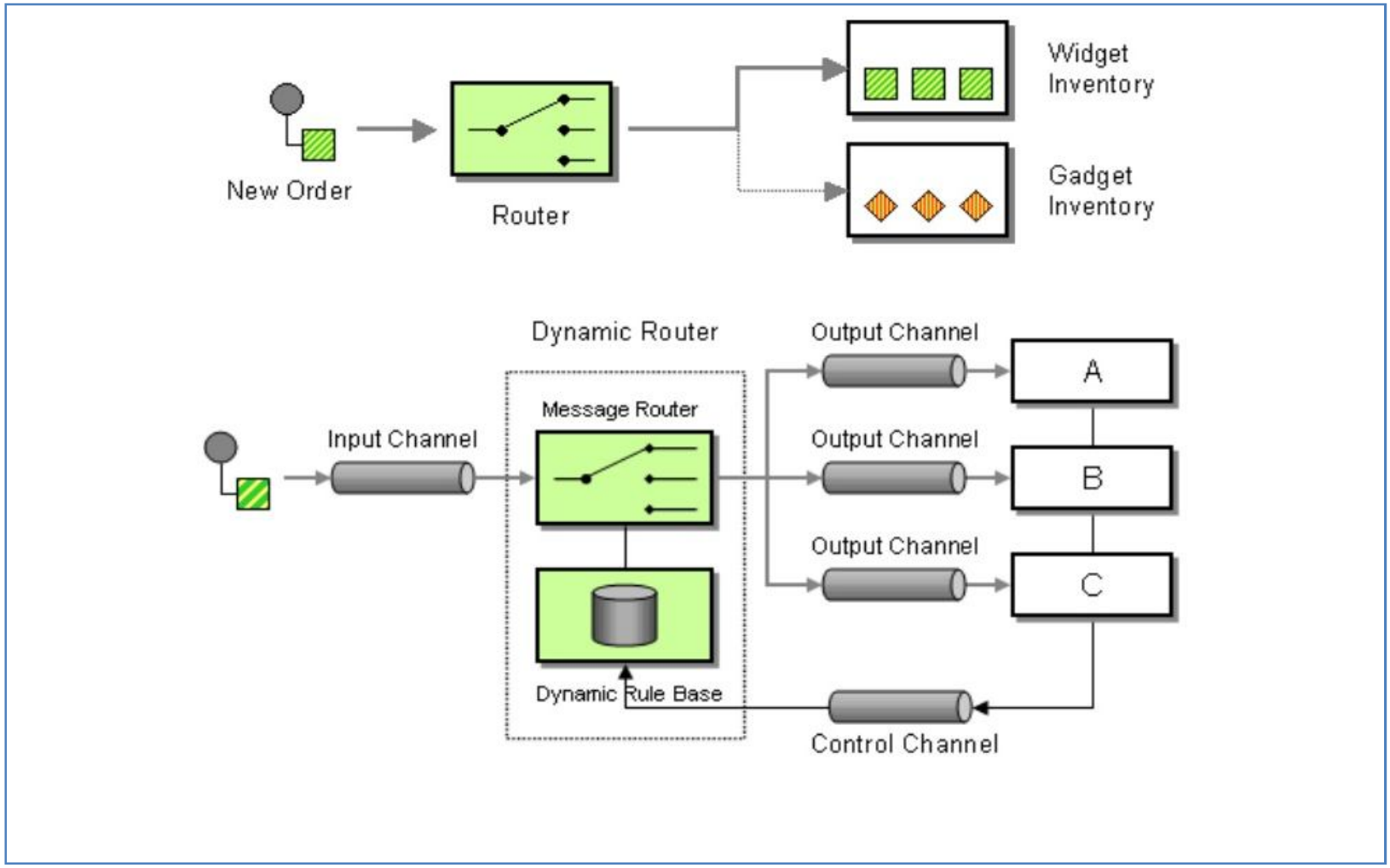
Messaging Endpoints



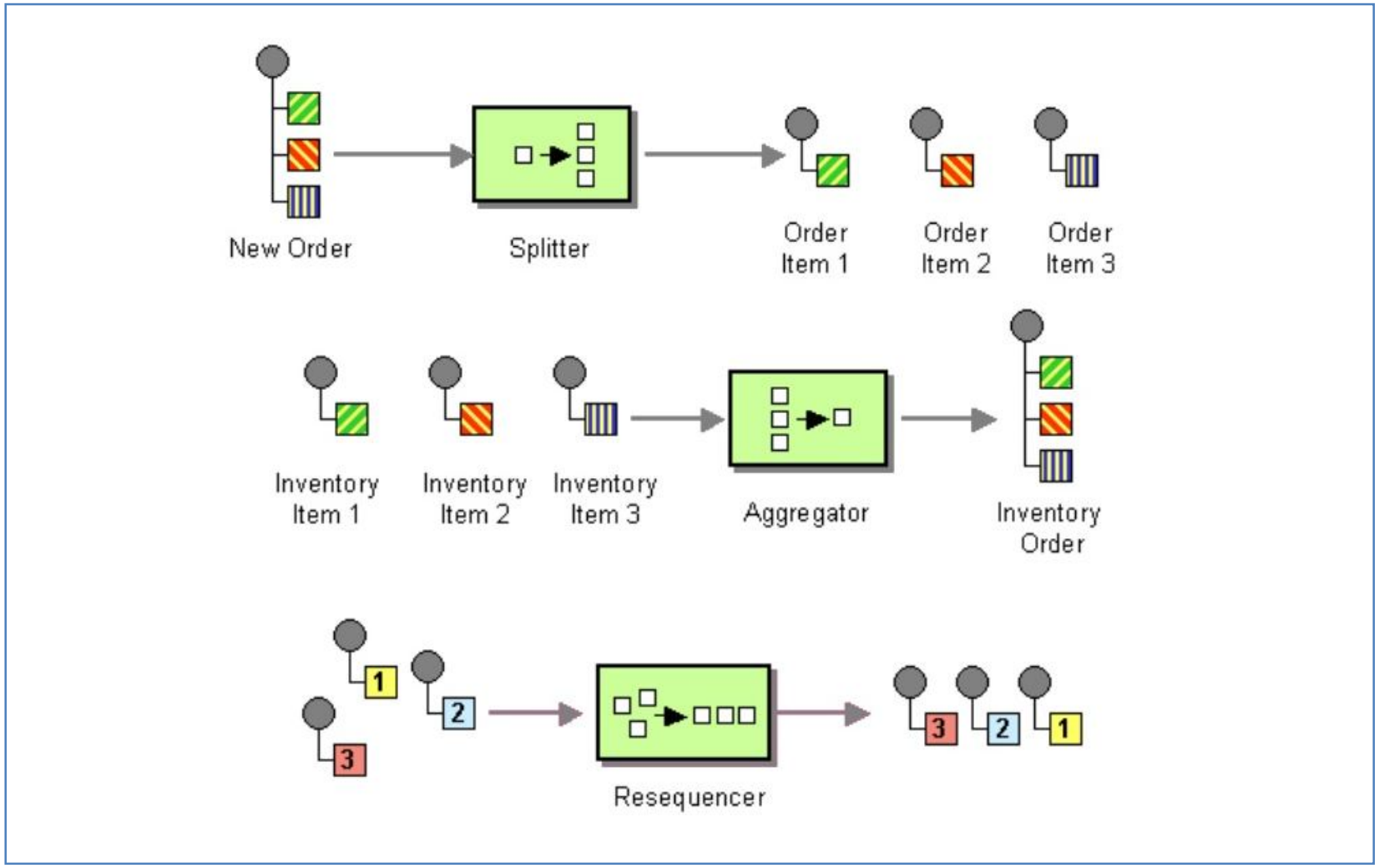
Messaging Endpoints



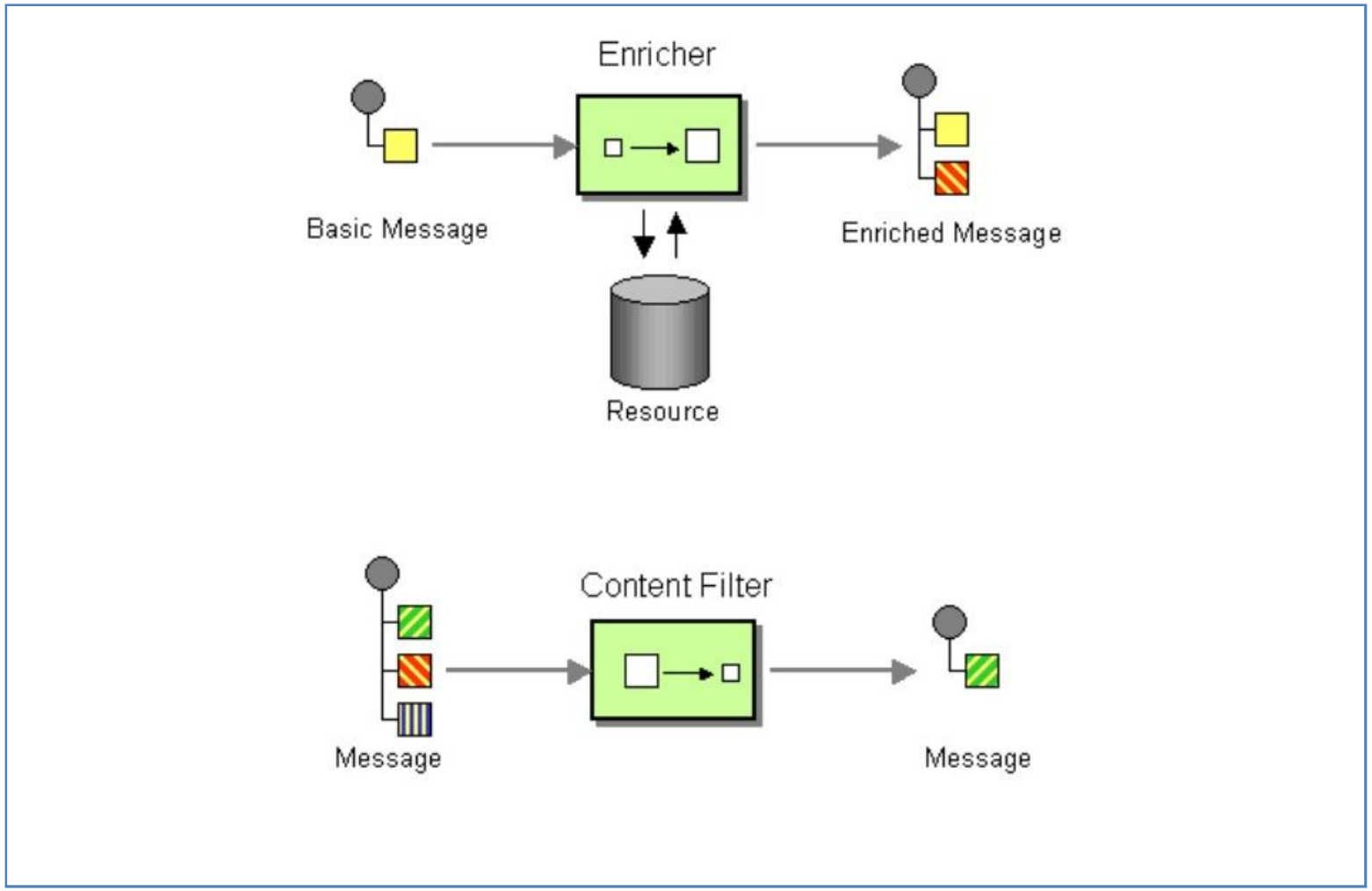
Message Router



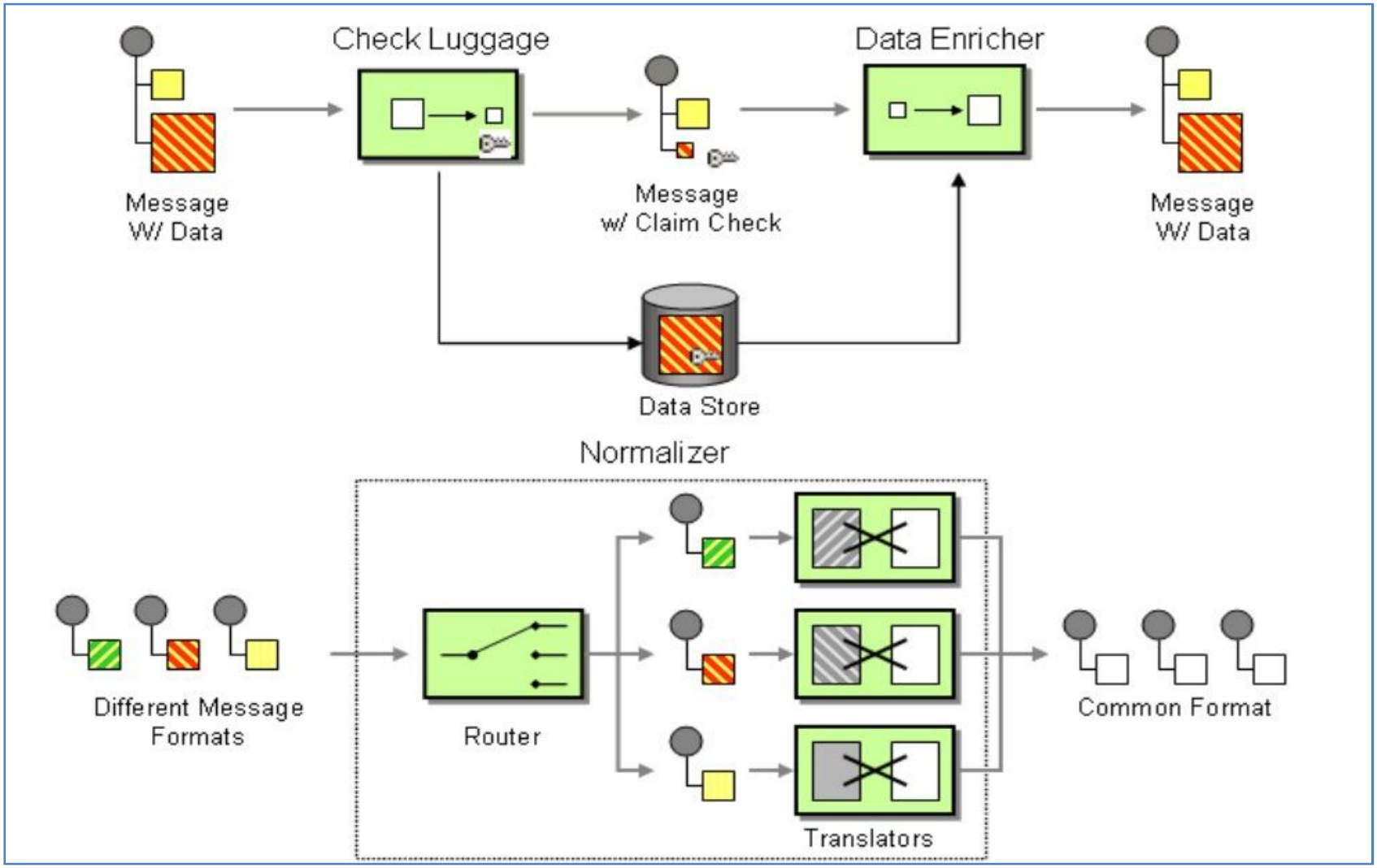
Splitter / Aggregator



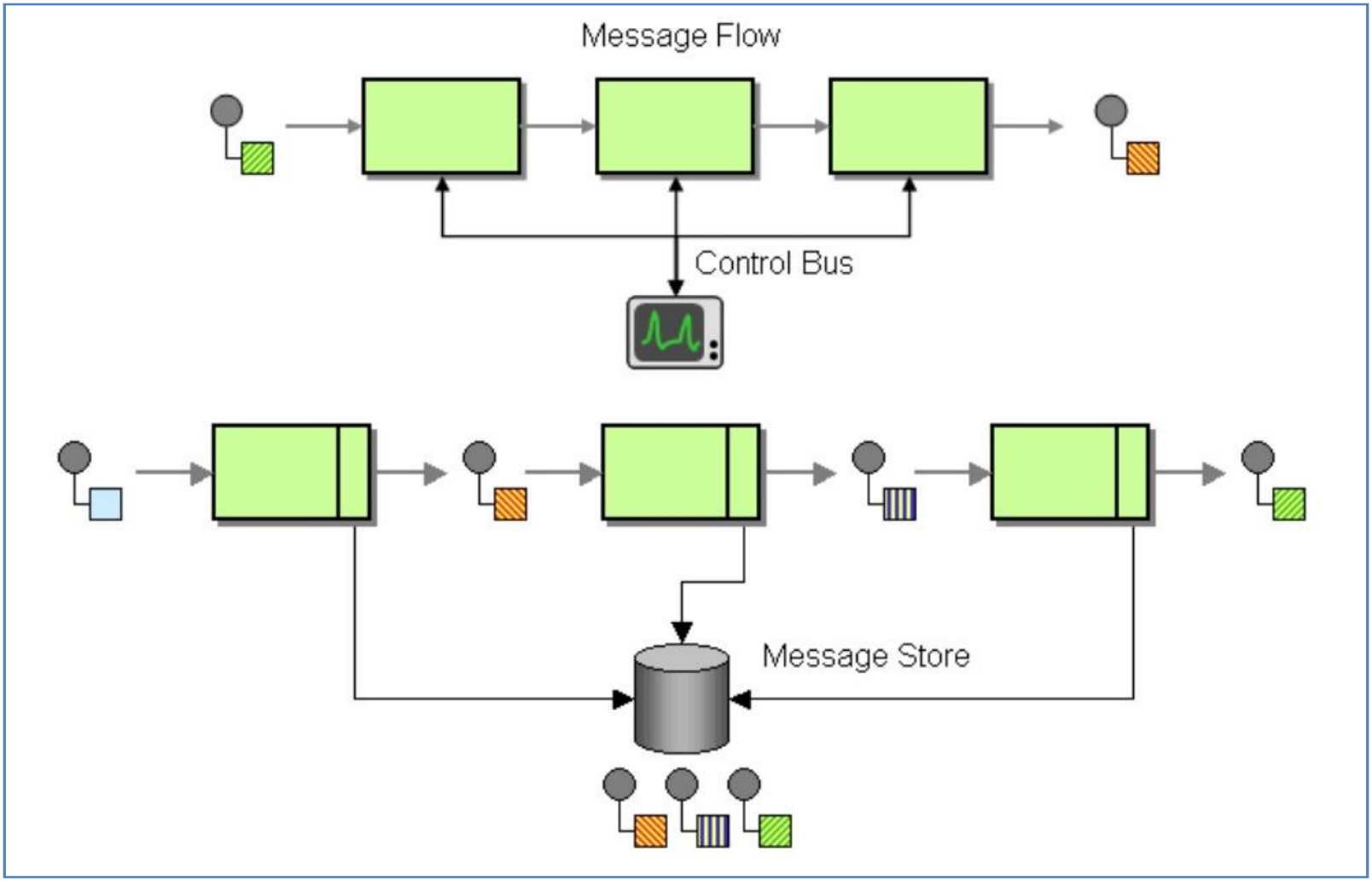
Simple Message Transformers



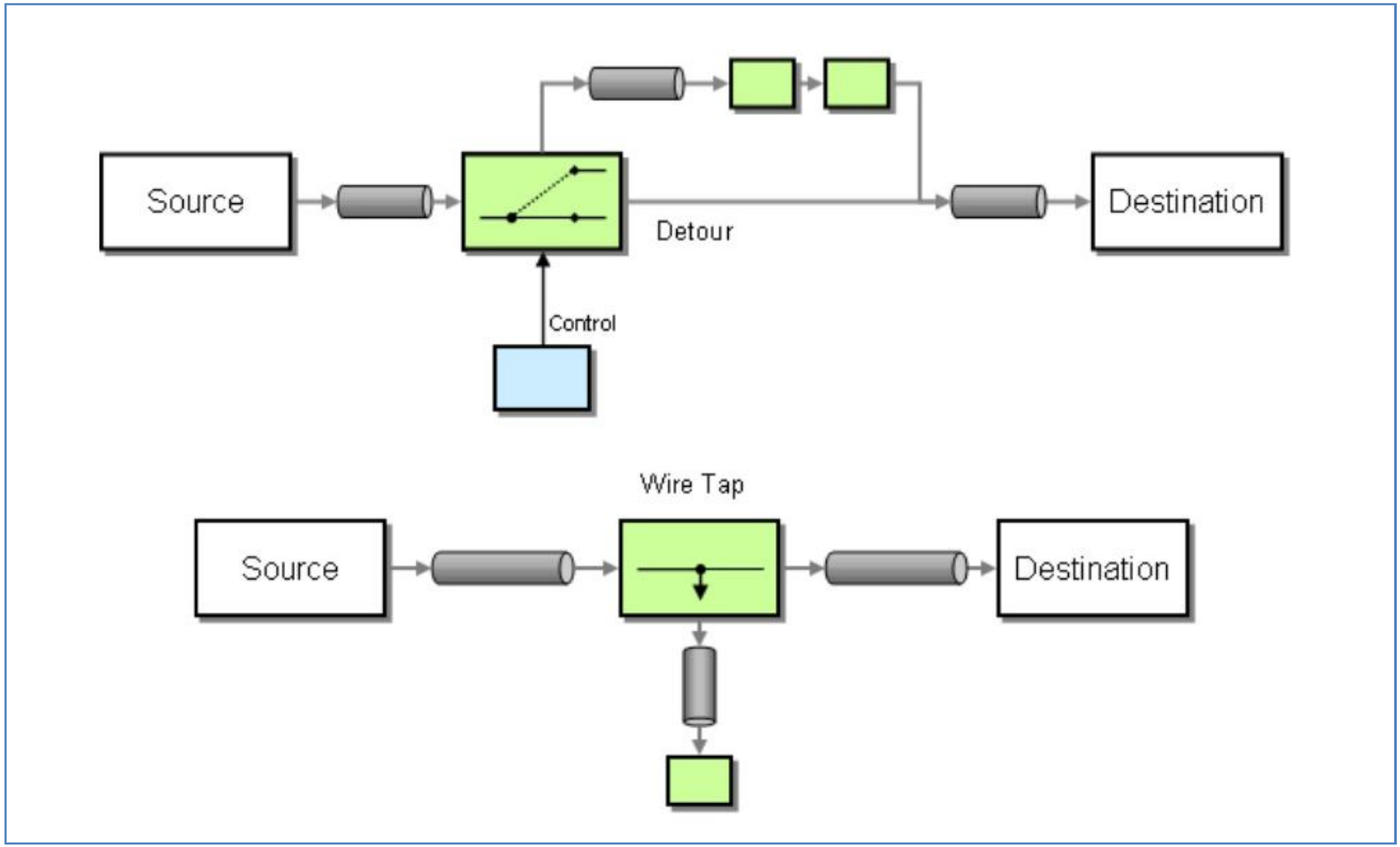
Compound Message Transformers



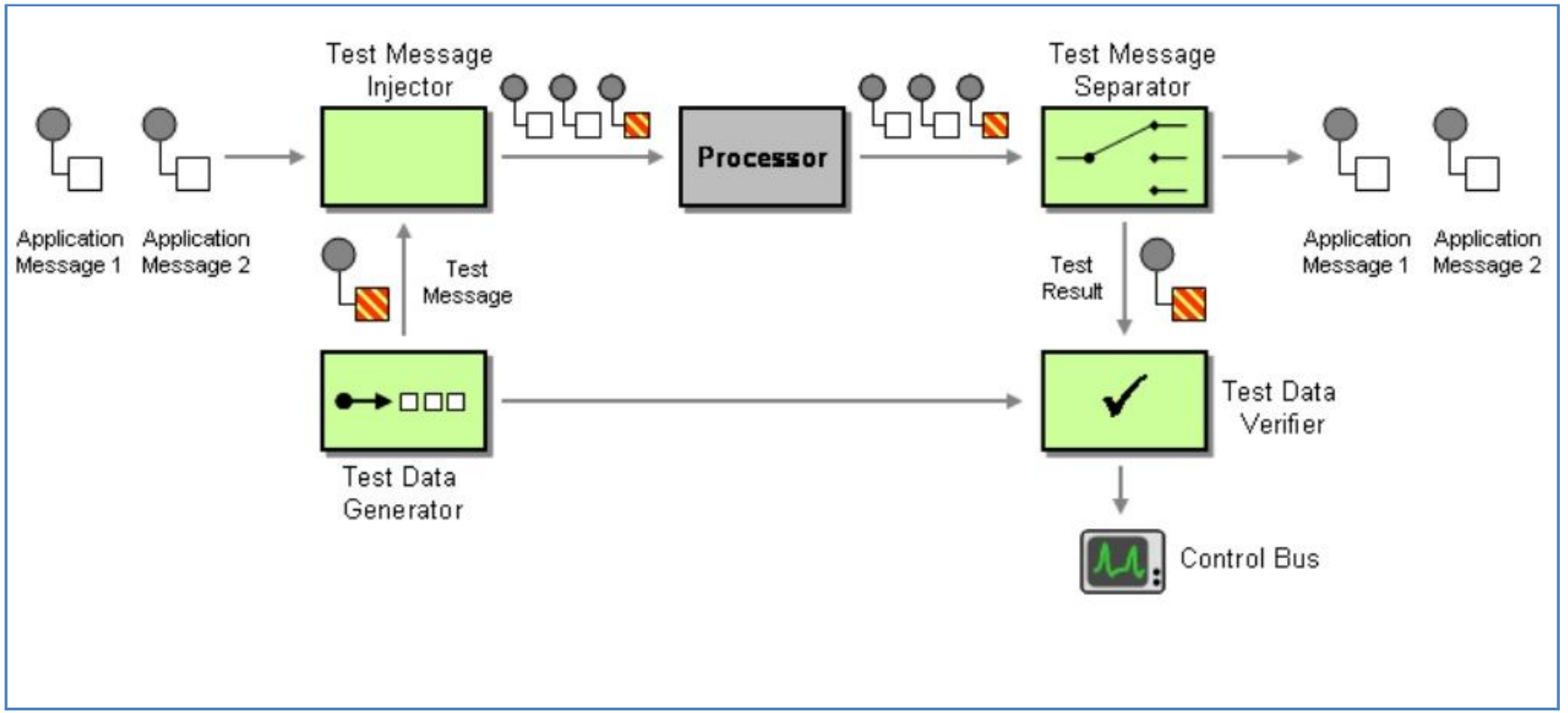
System Management



Flow Interception



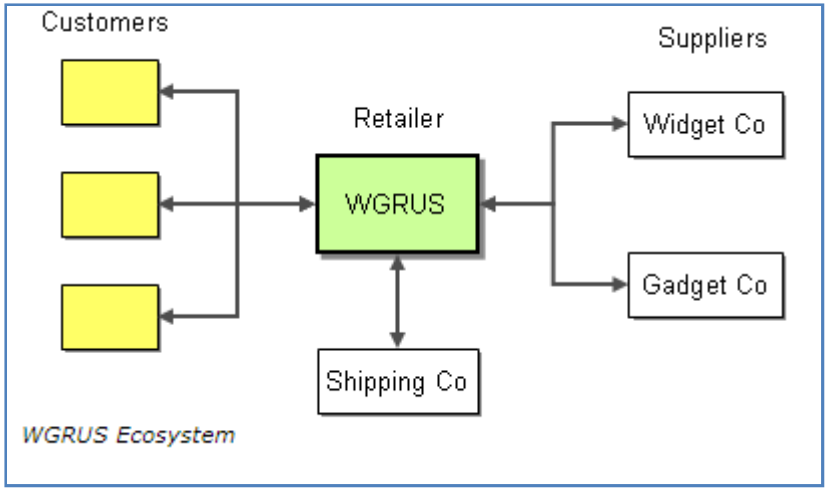
Test Message



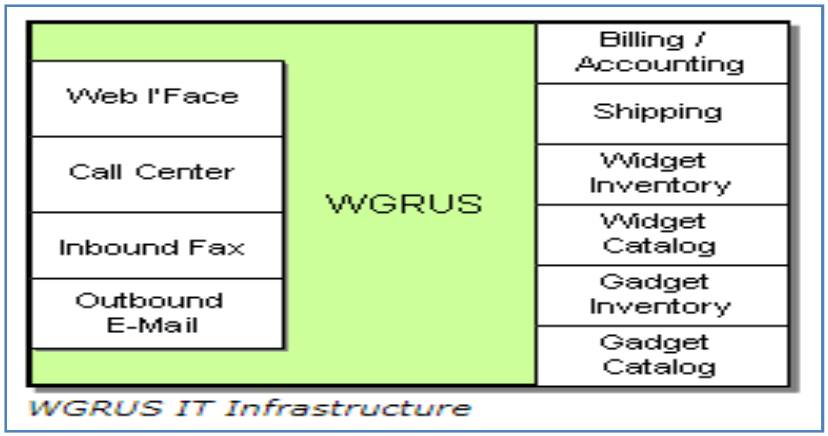
Example

Solving Integration Problems using Patterns
Widget-Gadget Corp Example

- Widgets & Gadgets 'R Us (WGRUS), an on-line retailer that buys widgets and gadgets from manufacturers and resells them to customers



WGRUS Ecosystem



WGRUS IT Infrastructure

Business Requirements

Take Orders: Customers can place orders via Web, phone or fax

Process Orders: Processing an order involves multiple steps, including verifying inventory, shipping the goods and invoicing the customer

Check Status: Customers can check the order status

Change Address: Customers can use a Web front-end to change their billing and shipping address

New Catalog: The suppliers update their catalog periodically. WGRUS needs to update its pricing and availability based in the new catalogs.

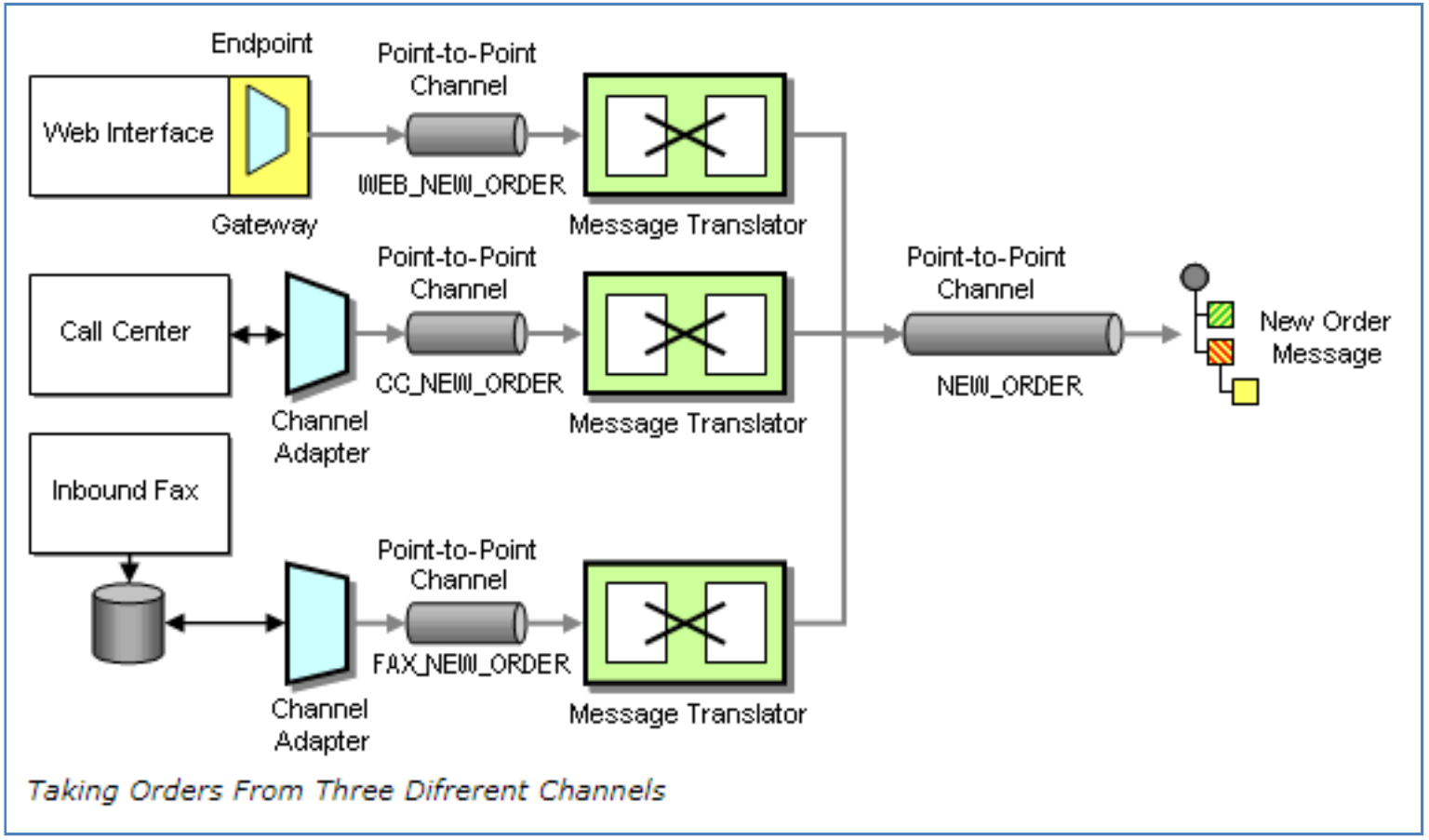
Announcements: Customers can subscribe to selective announcements from WGRUS.

Testing and Monitoring: The operations staff needs to be able to monitor all individual components and the message flow between them.

source: www.eaipatterns.com

Widget-Gadget Corp Example – Taking Orders

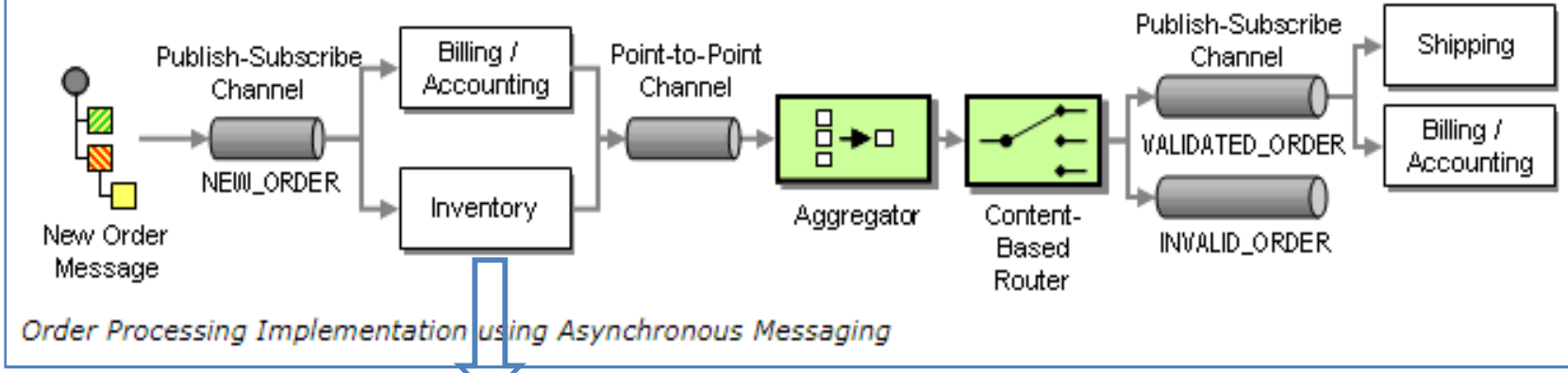
- Streamline order taking process
- Currently order to be taken from three different ways
- Design should support seamless integration of new ways for order taking in future



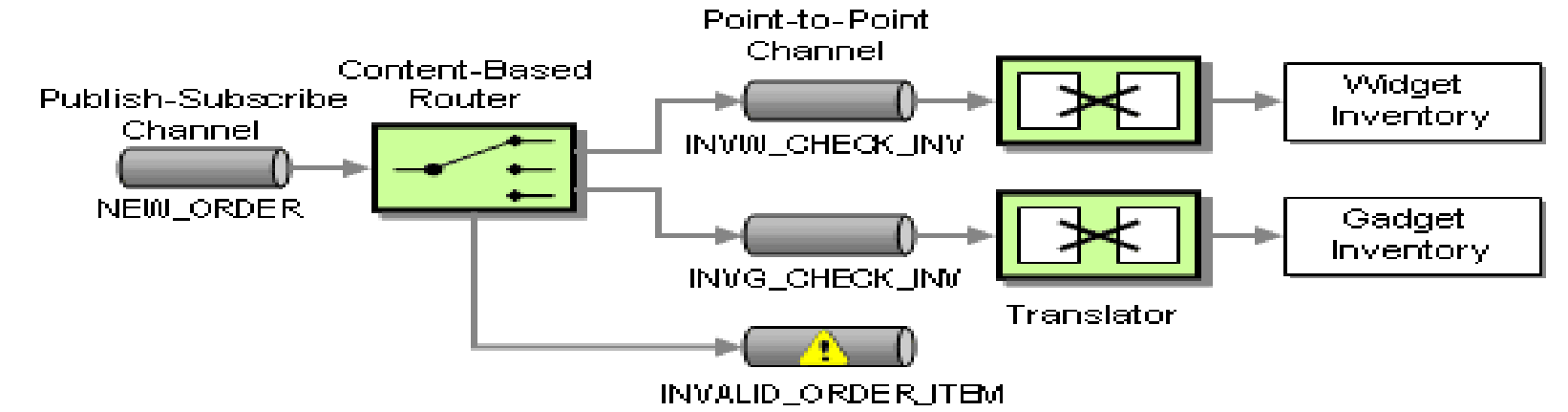
Taking Orders From Three Difrerent Channels

Widget-Gadget Corp Example – Process Orders

- Verify the customer's credit standing. If the customer has outstanding bills, reject the new order
- Verify inventory. We can't fulfill orders for items that are not in stock
- If the customer is in good standing and have inventory, ship the goods and bill the customer



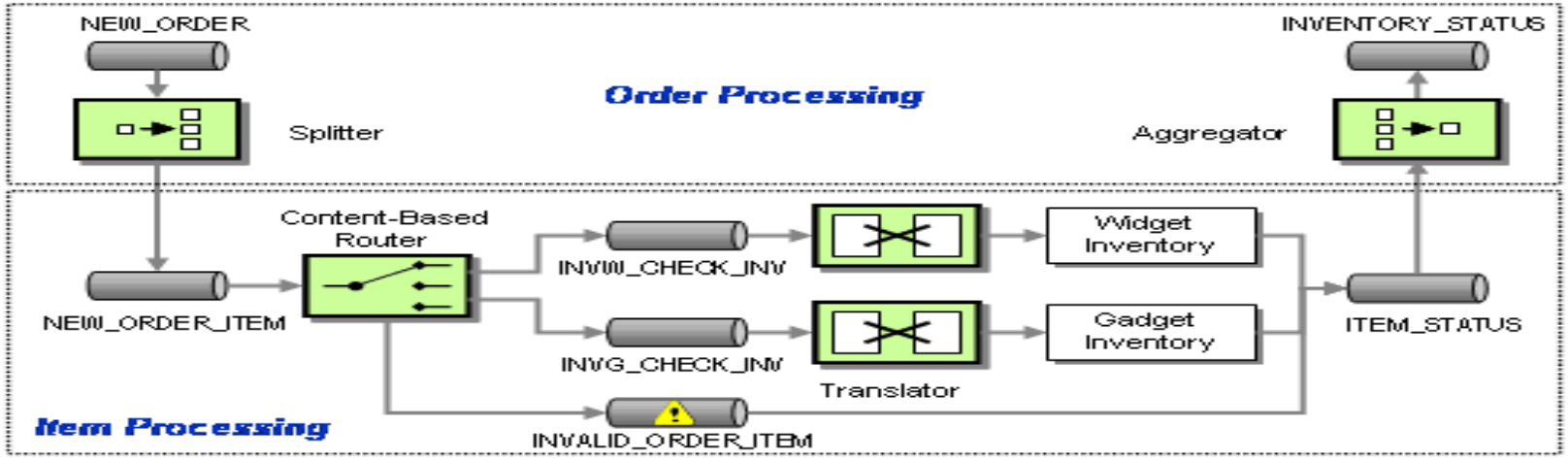
Order Processing Implementation using Asynchronous Messaging



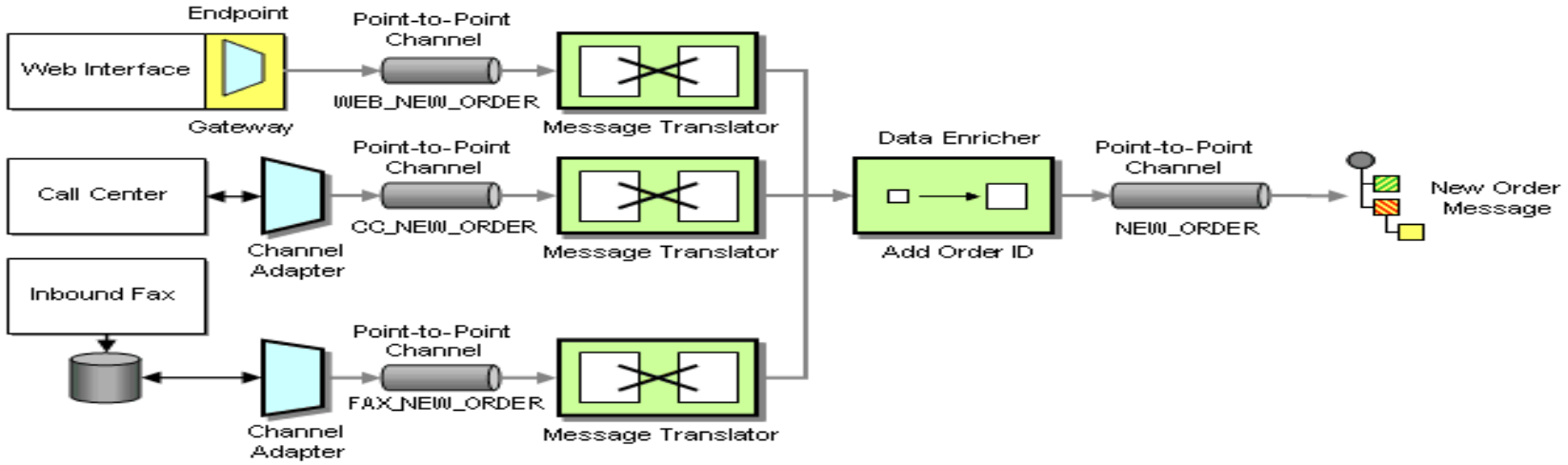
Routing the Inventory Request

Widget-Gadget Corp Example – Process Orders (contd.)

- Process order with multiple items (Splitter and Aggregator)
- Aggregator component requires info on correlation, completeness condition and aggregation algorithm



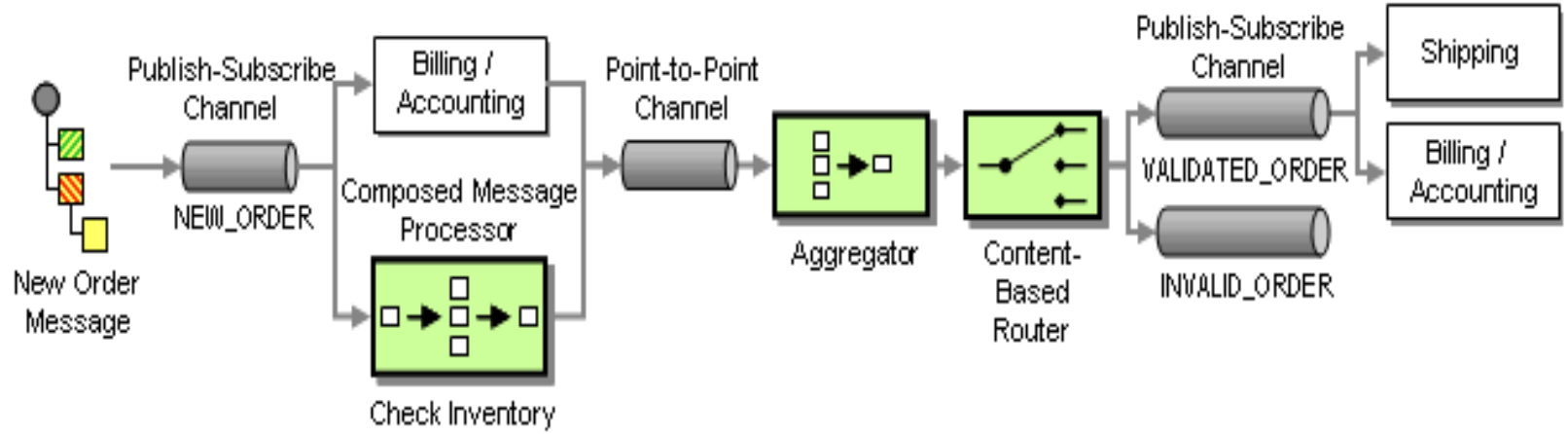
Processing Order Items Individually



Taking Orders With Enricher

Widget-Gadget Corp Example – Process Orders (contd.)

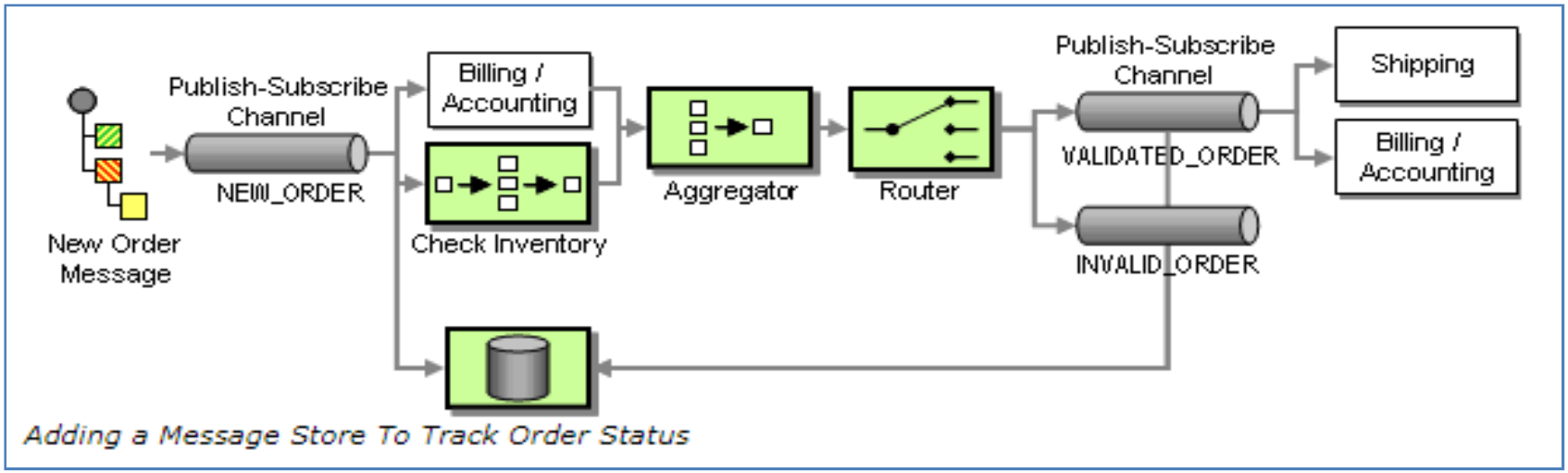
- Abstract inventory check process inside Composed Message Processor



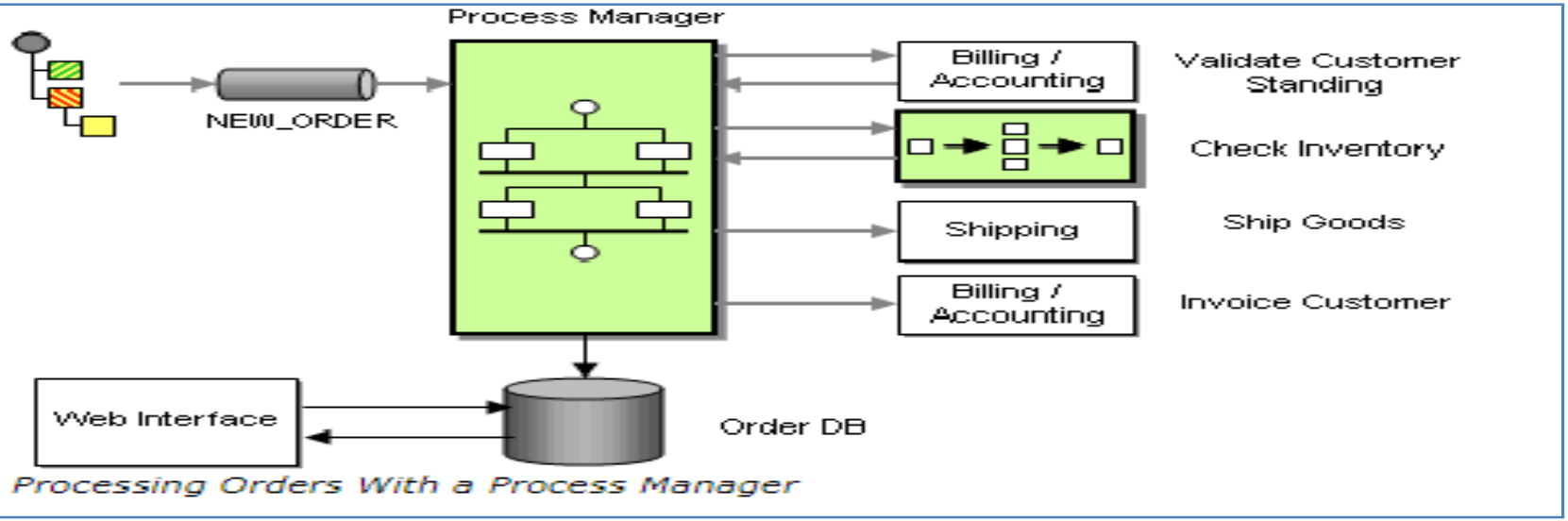
Revised Order Process Implementation

Widget-Gadget Corp Example – Checking Status

- Track order status on real-time
- Message Store to persist order status and Process Manager to orchestrate the message flow dynamically



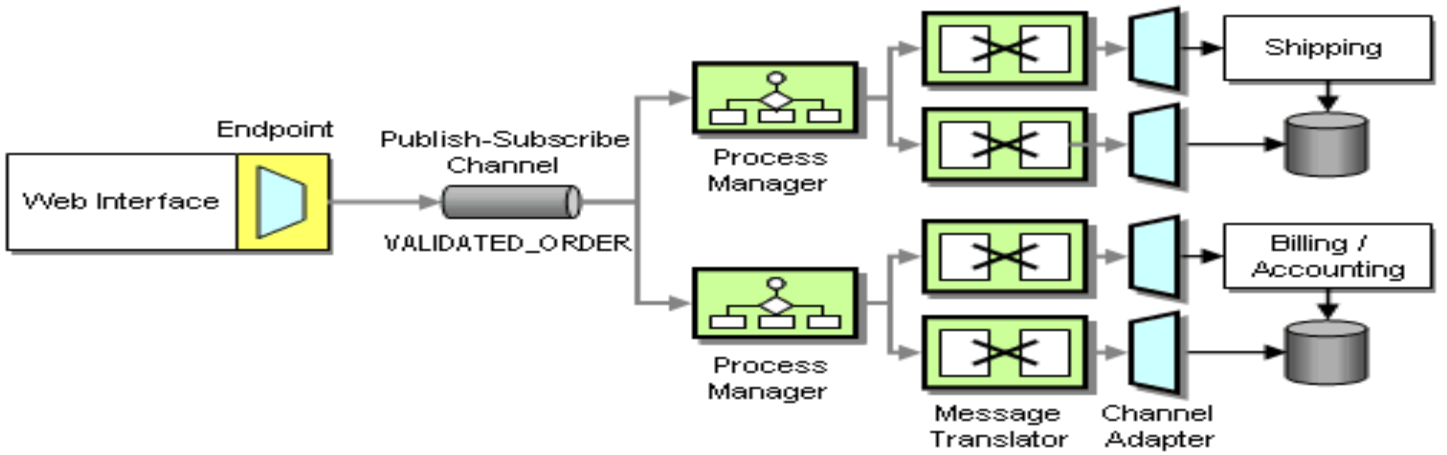
Adding a Message Store To Track Order Status



Processing Orders With a Process Manager

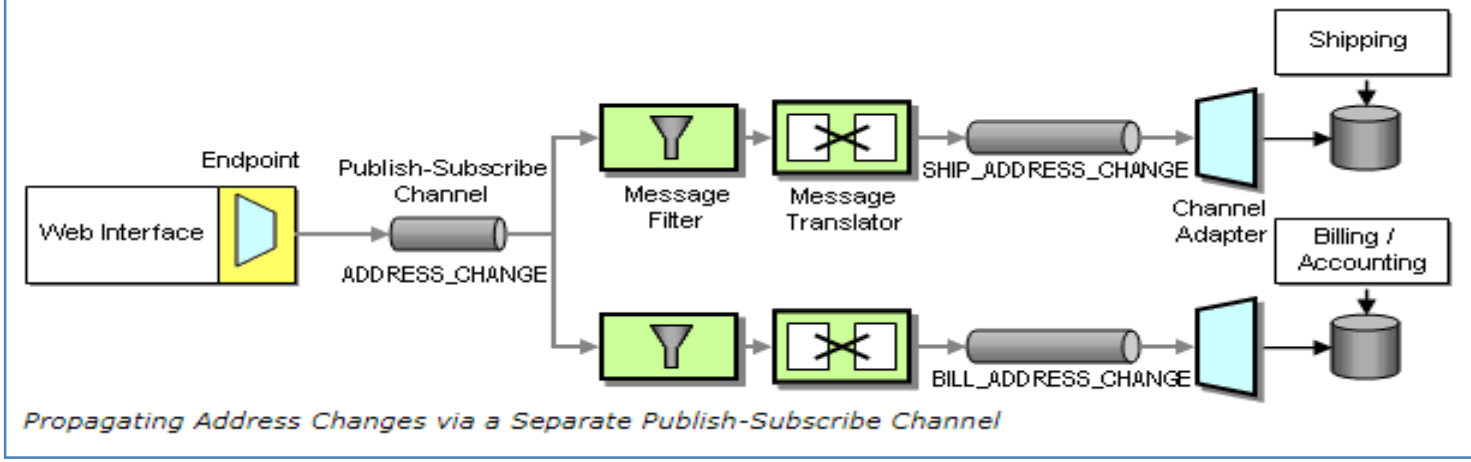
Widget-Gadget Corp Example – Change Address

- Send invoice to billing address and goods to shipping address
- Customers should have flexibility to specify the billing/shipping address while placing the orders



Including Address Data in the New Order Message

Approach 1

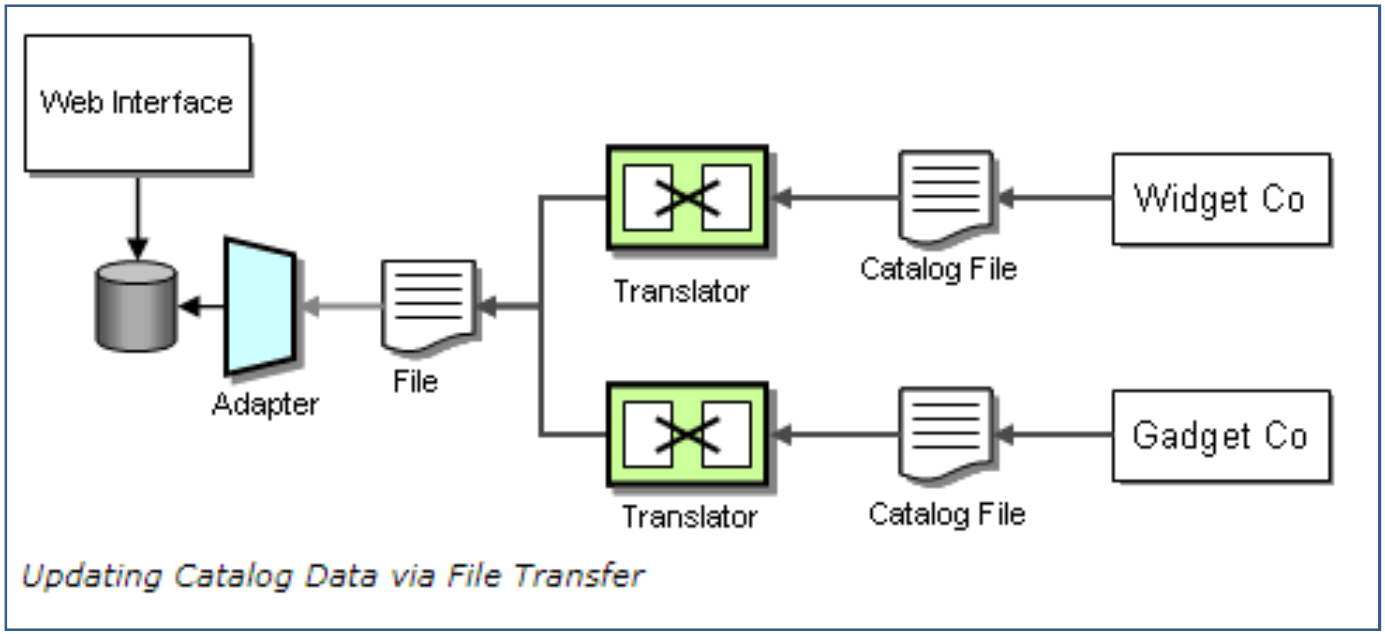


Propagating Address Changes via a Separate Publish-Subscribe Channel

Approach 2

Widget-Gadget Corp Example – New Catalog

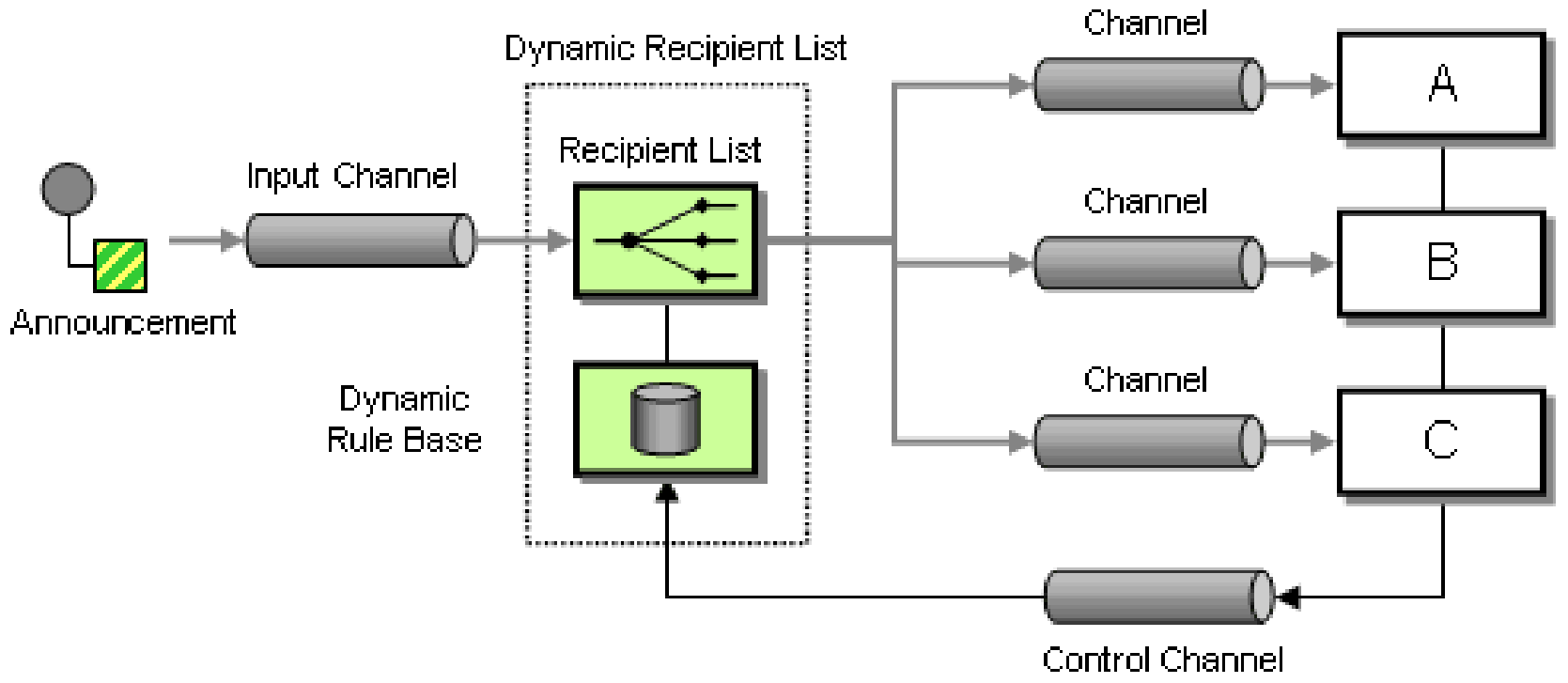
- List currently offered product items and prices on the web interface
- Sync product catalog details with supplier database periodically



Updating Catalog Data via File Transfer

Widget-Gadget Corp Example – Announcements

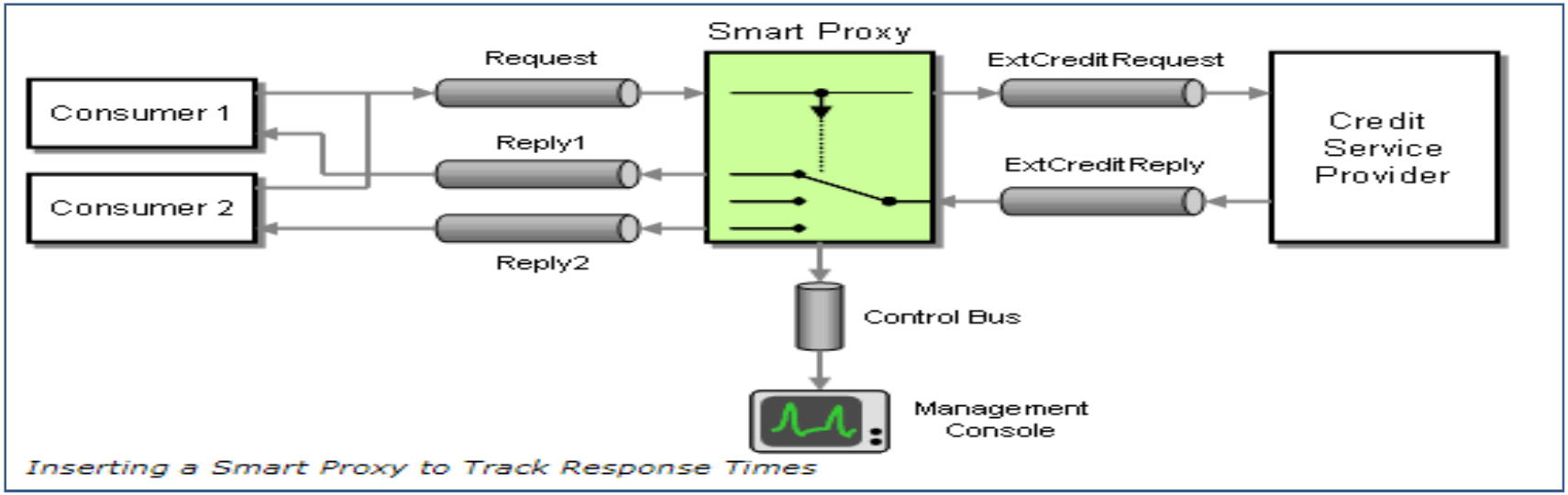
- Provide special offers and updates to customers based on their interests
- Design should be flexible to integrate various notification channels seamlessly in future



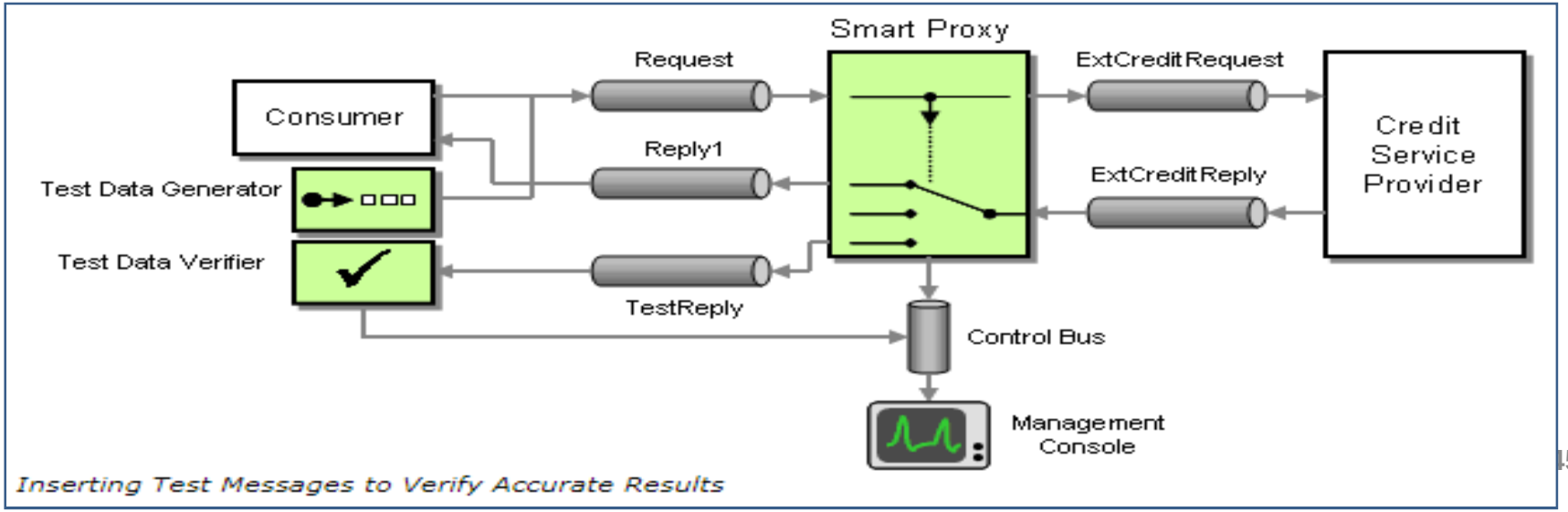
Sending Announcements With a Dynamic Recipient List

Widget-Gadget Corp Example – Testing and Monitoring

- Integrate with external credit rating agency to verify the customer's creditworthiness
- Test and monitor the credit rating agency's services regularly



Inserting a Smart Proxy to Track Response Times



Inserting Test Messages to Verify Accurate Results

References

- www.enterpriseintegrationpatterns.com
- Enterprise Integrations Patterns book
  by Grehor Hohpe and Bobby Woolf

Thank You!