



Enterprise Integrations Patterns

Ballerina usage patterns and best practices for implementing enterprise integrations. These patterns are based on the [Enterprise Integration Patterns](#) book by Gregor Hohpe and Bobby Woolf. Each sample is a simplified version of a real-world integration scenario.

Messaging Systems

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Message Channel

Connects one application to another

Message Channel Point-to-Point Channel Message



Message

Data transmitted through a message channel

Message Command Message Document Message Message Channel



Pipes And Filters

Divide the processing task into a sequence of smaller, independent processing steps

Pipes and Filters Message Filter Message Channel Message



Message Router

Route messages to different output channels

Message Router Message Channel Message Endpoint Message

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Message Translator Message Endpoint



Message Endpoint

Connects an application to a messaging channel

Message Endpoint Message Channel

Messaging Channels



Point-to-Point Channel

Ensures that only one receiver will receive a particular message

Point-to-Point Channel Message Channel Command Message



Publish-Subscribe Channel

Delivers a copy of a particular event to each receiver

Publish-Subscribe Channel Message Channel Message Endpoint Message Router

Channel Adapter

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Messaging Bridge

Connect messaging systems

Messaging Bridge

Message Channel

Message Endpoint

Channel Adapter

Message

Message Construction



Command Message

Use message to invoke a procedure in another application

Command Message

Messaging

Point-to-Point Channel



Document Message

Transfer data to another application

Document Message

Message Channel

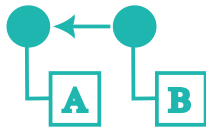
Message Endpoint

Point-to-Point Channel

Request-Reply

Event Message

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Identify the message that a reply is for

Correlation Identifier Request Reply Selective Consumer Message



Message Sequence

Send large data sets in chunks

Message Sequence Message Channel Message Endpoint Message



Format Indicator

Process the data based on the received message format

Format Indicator Canonical Data Model

Message Routing



Content-Based Router

Route messages based on message content

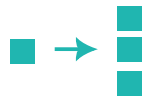
Content Based Router Message Filter Dynamic Router

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[Message Filter](#)[Message Channel](#)[Message Endpoint](#)

Recipient List

Route messages to multiple recipients

[Recipient List](#)[Content Based Router](#)[Message Router](#)

Splitter

Process messages with multiple elements

[Splitter](#)[Content Filter](#)[Event Message](#)

Aggregator

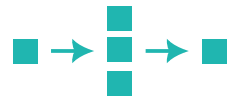
Wait for a sequence of messages and combine them

[Aggregator](#)

Resequencer

Reorder a received sequence of messages.

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Composed Message Processor

Aggregator

Content Based Router



Scatter-Gather

Send messages to multiple recipients and re-aggregate the responses

Scatter-Gather

Aggregator

Message Channel

Message Endpoint

Message Router

Message



Routing Slip

Route message according to an order.

Routing Slip

Message Channel

Message Endpoint

Message Router



Process Manager

Process messages with steps unknown at design time

Process Manager

Command Message

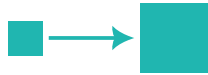
Aggregator

Point-to-Point Channel

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Envelope Wrapper Content Enricher Message Channel Message



Content Enricher

Add data to the message

Content Enricher Message Channel Message Endpoint Message



Content Filter

Remove data from the message

Content Filter Message Channel Message Endpoint

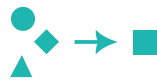


Claim Check

Reduce message volume and send across the system without losing message content

Claim Check Content Enricher Content Filter

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Normalizer

Process messages with different formats

Normalizer Message Channel Message Endpoint Message Translator
Message Router Message



Canonical Data Model

Common message format for communication between applications

Canonical Data Model Message Router Message Translator Format Indicator

Messaging Endpoints



Messaging Gateway

Encapsulates the messaging from the application

Messaging Gateway Message



Messaging Mapper

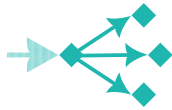
Mapping infrastructure messages to domain objects

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Consume messages when the application is ready

Polling Consumer Durable Subscriber Message



Message Dispatcher

Coordinate message processing

Message Dispatcher Competing Consumers Transactional Client



Selective Consumer

Filters the received messages using a criteria

Selective Consumer Message Filter Content Based Router Message



Idempotent Receiver

Safely receive the same message multiple times

Idempotent Receiver Message Message Channel

Service Activator

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System Management



Wire Tap

Publish to a secondary channel for inspection

Wire Tap Message Channel Message Endpoint



Message History

Analyze and debug message flow in a loosely coupled system

Message History Message Store Message Router



Message Store

Capture message information in a central location

Message Store Message Channel Wire Tap Message Endpoint Message



Test Message

Assure the health of messaging components

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In the creation of Ballerina, we were inspired by many technologies. Thank you to all that have come before us (and forgive us if we missed one): Java, Go, C, C++, D, Rust, Haskell, Kotlin, Dart, TypeScript, JavaScript, Python, Perl, Flow, Swift, Elm, RelaxNG, NPM, Crates, Maven, Gradle, Kubernetes, Docker, Envoy, Markdown, GitHub, and WSO2.

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