



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

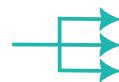
Point-to-Point Channel



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

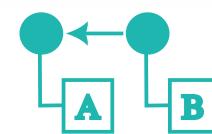
Transfer data to another application

[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

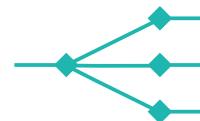
Route messages based on message content

Content Based Router Message Filter Dynamtic 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

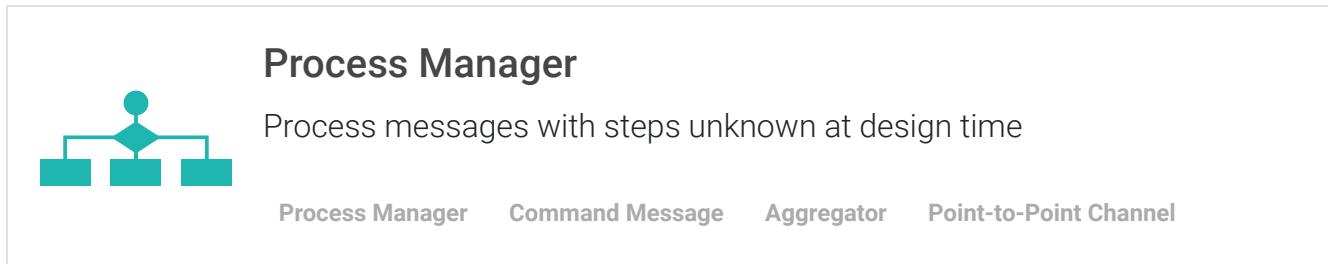
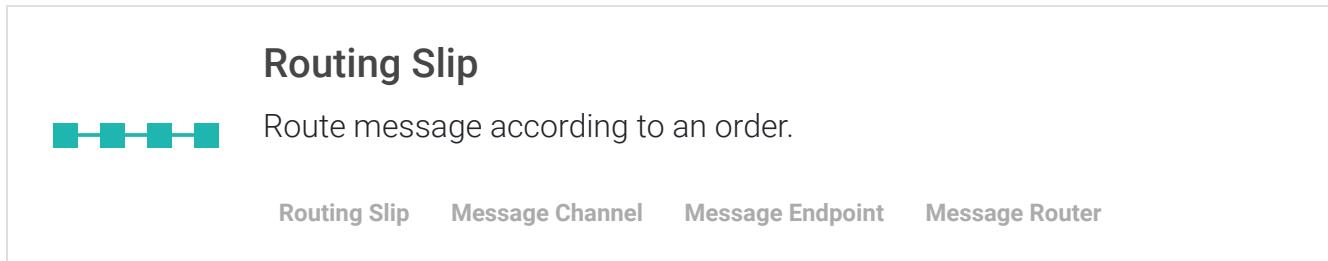
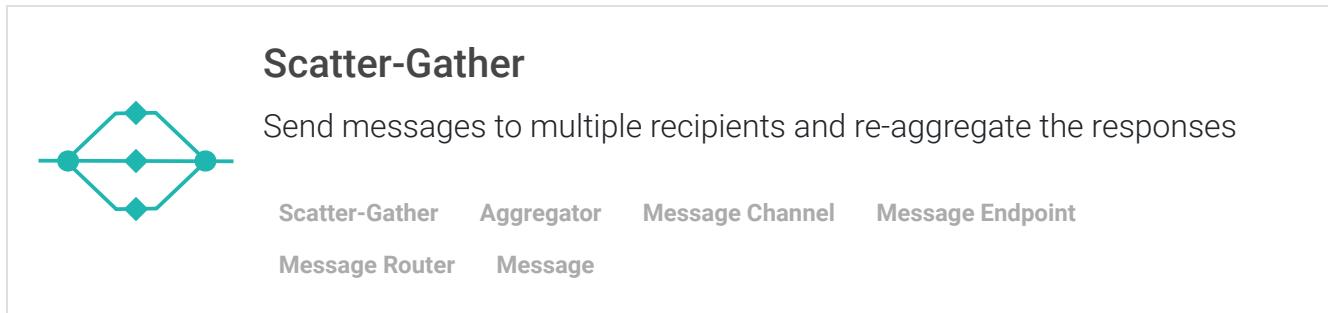
Aggregator

Resequencer



Reorder a received sequence of messages.

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Envelope Wrapper Content Enricher Message Channel Message



Content Enricher



Add data to the message

Content Enricher Message Channel Message Endpoint Message

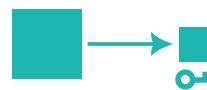
Content Filter



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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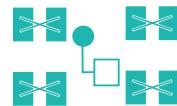
Normalizer



Process messages with different formats

Normalizer Message Channel Message Endpoint Message Translator
Message Router Message

Canonical Data Model

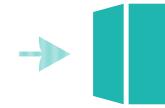


Common message format for communication between applications

Canonical Data Model Message Router Message Translator Format Indicator

Messaging Endpoints

Messaging Gateway



Encapsulates the messaging from the application

Messaging Gateway Message

Messaging Mapper



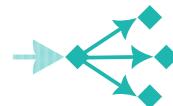
Mapping infrastructure messages to domain objects

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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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