Spring Boot Microservices

Beginner to Guru

Introduction to JMS

What is JMS?

- **JMS** - Java Messaging Service
- JMS is a Java API which allows a Java Application to send a message to another application
  - Generally the other application is a Java application - but not always!
- JMS is a standard Java API which requires an underlying implementation to be provided
  - Much like JPA - where JPA is the API standard, and Hibernate is the implementation
- JMS is highly scalable and allows you to loosely couple applications using asynchronous messaging

JMS Implementations

- Amazon SQS
- Apache ActiveMQ
- JBoss Messaging
- IBM MQ - (Closed source / paid)
- OracleAQ - (Closed Source / paid)
- RabbitMQ
- Many many more!

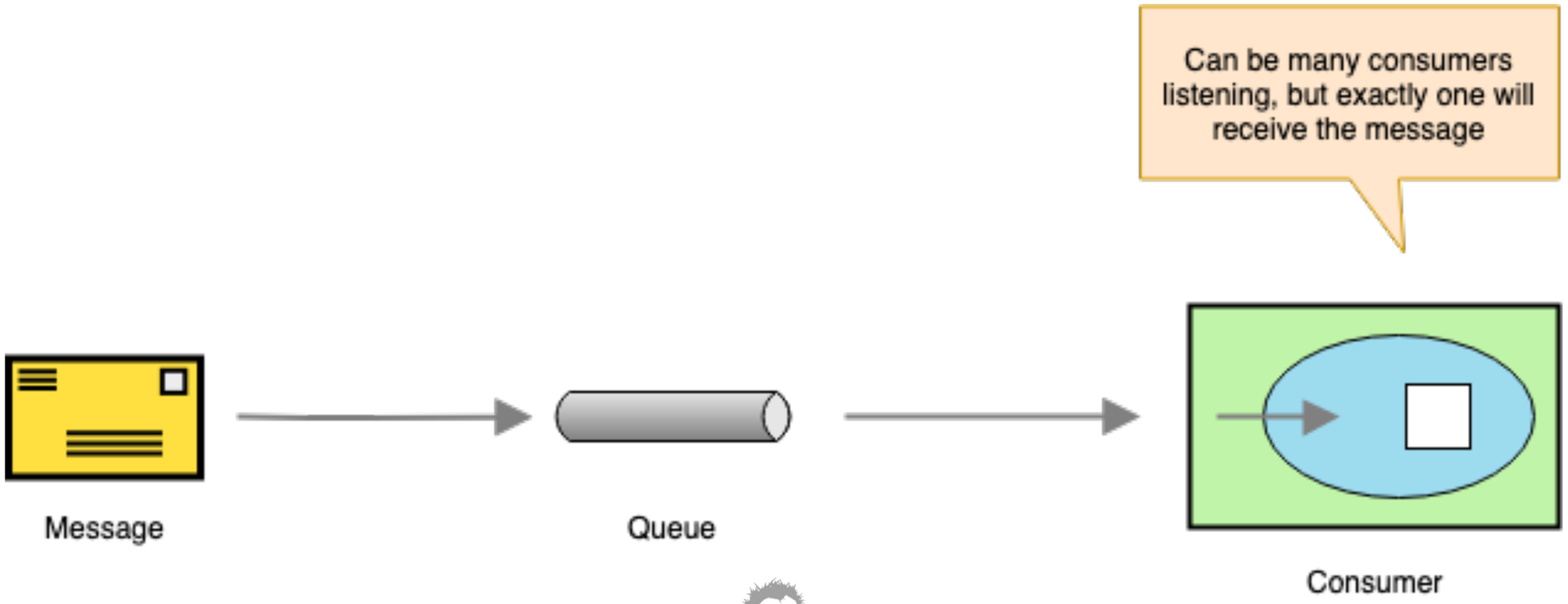
Why Use JMS over REST?

- JMS is a true messaging service
- Asynchronous - send and forget!
- Greater through put - the HTTP protocol is slow comparatively
  - JMS protocols are VERY performant
- Flexibility in message delivery - Deliver to one or many consumers
- Security - JMS has a very robust security
- Reliability - Can guarantee message delivery

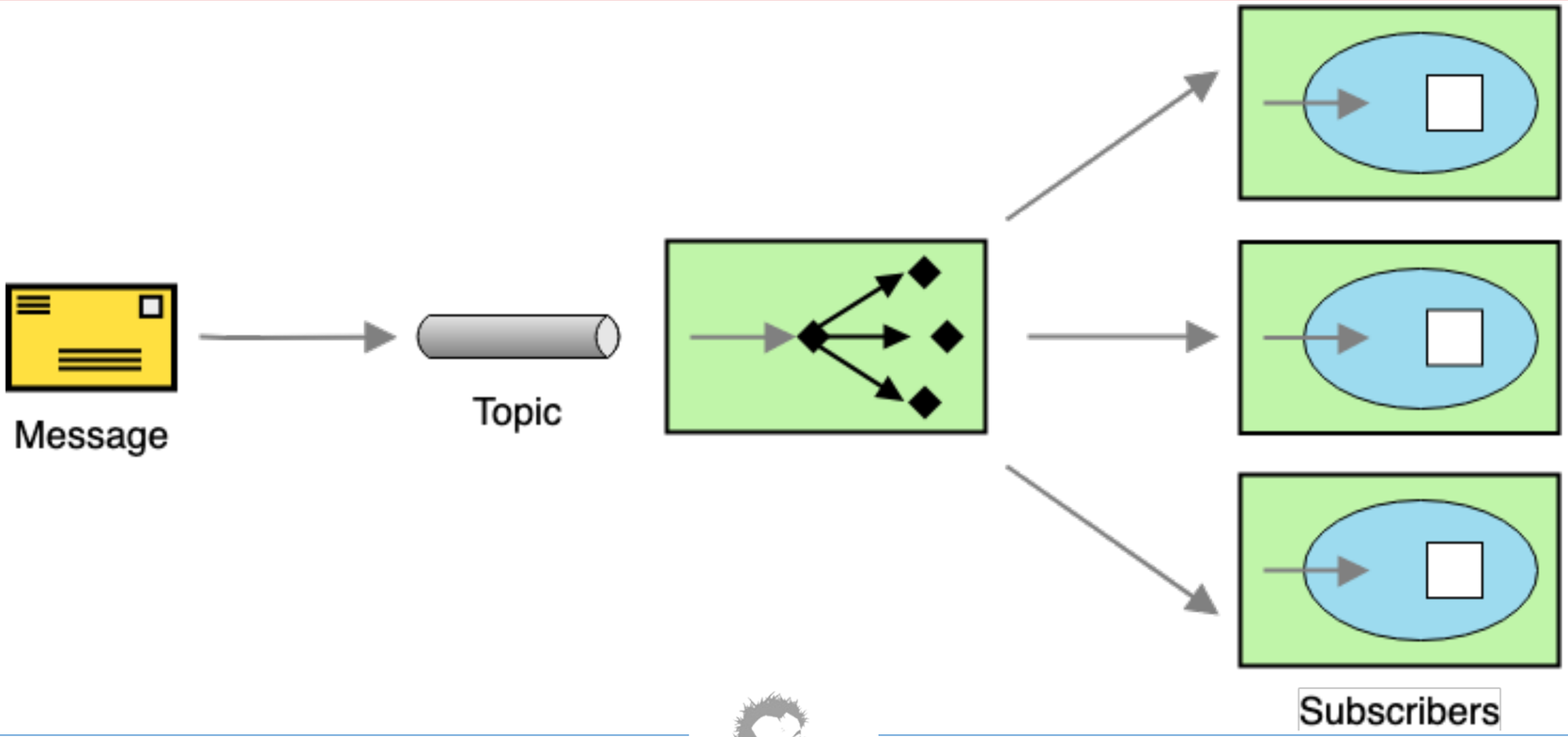
Types of Messaging

- **Point to Point**
  - Message is queued and delivered to one consumer
  - Can have multiple consumers - but message will be delivered only ONCE
  - Consumers connect to a queue
- **Publish / Subscribe**
  - Message is delivered to one or more subscribers
  - Subscribers will subscribe to a topic, then receive a copy of all messages sent to the topic

Point to Point



Publish / Subscribe



Key Terms

- **JMS Provider** - JMS Implementation
- **JMS Client** - Application which sends or receives messages from the JMS provider
- **JMS Producer or Publisher** - JMS Client which sends messages
- **JMS Consumer or Subscriber** - JMS Client which receives messages
- **JMS Message** - the entity of data sent (details next slide!)
- **JMS Queue** - Queue for point to point messages. Often, not always, FIFO
- **JMS Topic** - Similar to a queue - but for publish and subscribe

JMS Message

- A JMS Message contains three parts:
  - **Header** - contains meta data about the message
  - **Properties** - Message properties are in 3 sections
    - **Application** - From Java Application sending message
    - **Provider** - Used by the JMS provider and are implementation specific
    - **Standard Properties** - Defined by the JMS API - Might not be supported by the provider
  - **Payload** - the message itself

JMS Header Properties

- **JMSCorrelationID** - String value, typically a UUID. Set by application, often used to trace a message through multiple consumers
- **JMSExpires** - Long - zero, does not expire. Else, time when message will expire and be removed from the queue
- **JMSMessageId** - String value, typically set by the JMS Provider
- **JMSPriority** - Integer - Priority of the message
- **JMSTimestamp** - Long - Time message was sent

JMS Header Properties (Cont…)

- **JMSType** - String - The type of the message
- **JMSReplyTo** - Queue or topic which sender is expecting replies
- **JMSRedelivery** - Boolean - Has message been re-delivered?
- **JMSDeliveryMode** - Integer, set by JMS Provider for delivery mode
  - **Persistent** (Default) - JMS Provider should make best effort to deliver message
  - **Non-Persistent** - Occasional message lost is acceptable

JMS Message Properties

- **JSMXUserId** - (String) User Id sending message. Set by JMS Provider.
- **JMSXAppID** - (String) Id of the application sending the message. Set by JMS Provider.
- **JMSXDeliveryCount** - (Int) Number of delivery attempts. Set by JMS Provider.
- **JMSXGroupID** - (String) The message group which the message is part of. Set by Client.
- **JMSXGroupSeq** - (Int) Sequence number of message in group. Set by Client.
- **JMSXProducerTDIX** - (String) Transaction id when message was produced. Set by JMS Producer.

JMS Message Properties (Cont…)

- **JSMXConsumerTXID** - (String) Transaction Id when the message was consumed. Set by JMS Provider.
- **JMSXRcvTimestamp** - (Long) Timestamp when message delivered to consumer. Set by JMS Provider.
- **JMSXState** - (Int) State of the JMS Message. Set by JMS Provider.

JMS Custom Properties

- The JMS Client can set custom properties on messages
- Properties are set as key / value pairs (String, value)
- Values must be one of:
  - String, boolean, byte, double, float, int, short, long or Object

JMS Provider Properties

- The JMS Client can also set JMS Provider Specific properties
- These properties are set as JMS_<provider name>
- JMS Provider specific properties allow the client to utilize features specific to the JMS Provider
- Refer to documentation of your selected JMS Provider for details

JMS Message Types

- **Message** - Just a message, no payload. Often used to notify about events
- **BytesMessage** - Payload is an array of bytes
- **TextMessage** - Message is stored as a string. (Often JSON or XML)
- **StreamMessage** - sequence of Java primitives
- **MapMessage** - message is name value pairs
- **ObjectMessage** - Message is a serialized Java object

Which Message Type to Use?

- JMS 1.0 was originally released in 1998 - Initial focus was on Java to Java messaging
- Since 1998 Messaging and technology has grown and evolved beyond the Java ecosystem
- JMS TextMessages with JSON or XML payloads are currently favored
  - Decoupled from Java - can be consumed by any technology
  - Not uncommon to 'bridge' to non-java providers
  - Makes migration to a non-JMS provider less painful
    - Important since messaging is becoming more and more generic and abstracted

SPRING FRAMEWORK

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