Message Broker

Systems Analysis & Design

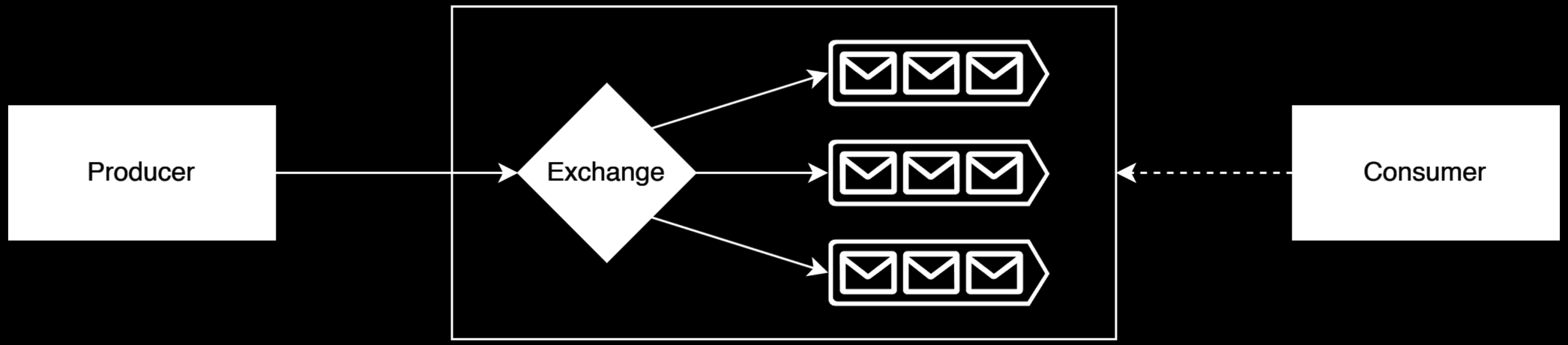
Learning Objectives

By the end of this session, you will have acquired the following information:

- Message Broker
- Exchange Types

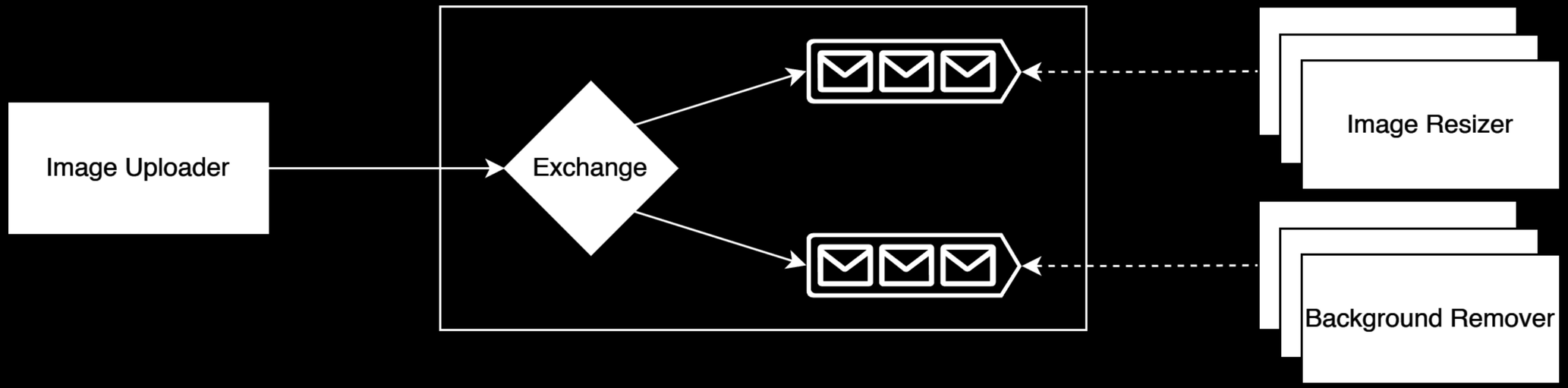
- **Message broker**
  - Accepts and forwards messages.
- **Post Box Role**
  - Acts as a post box where messages are deposited.
- **Post Office Role**
  - Decides the destination post box for each message.
- **Letter Carrier Role**
  - Ensures that messages reach their intended recipients.

The producer sends messages.
The exchange determines the destination queue(s) for each message.
The queue stores messages.
The consumer waits to receive messages.



Illustrative Example

By default, RabbitMQ uses a round-robin method to send each message to the next consumer.



Message Acknowledgment

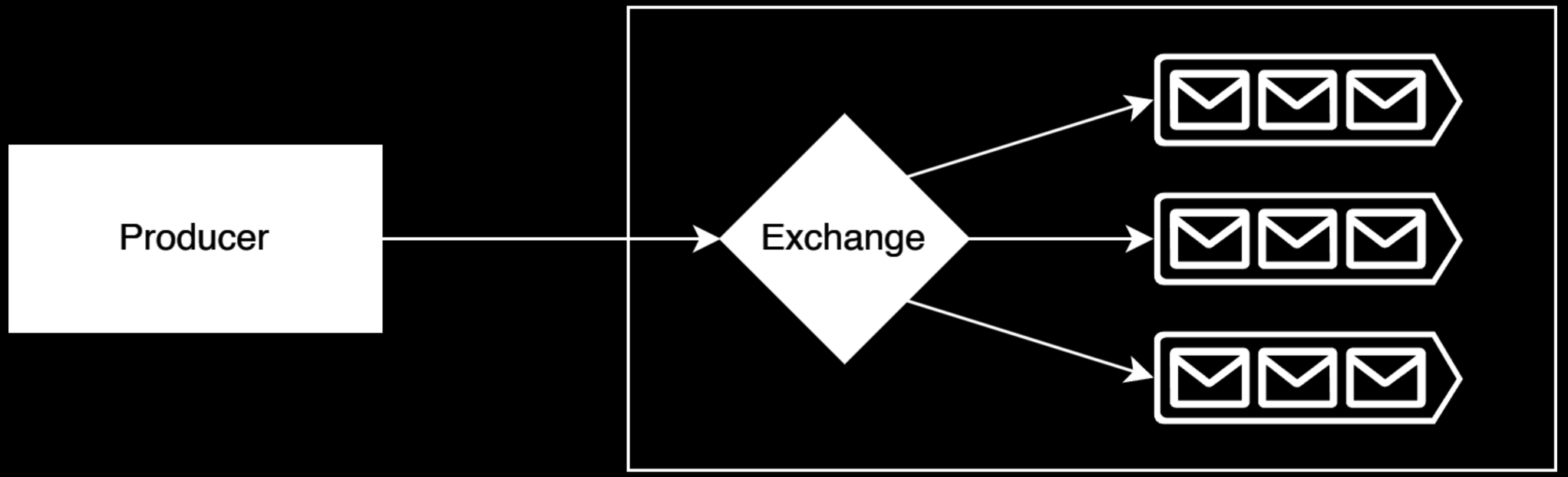
- **Task Loss**
  - Tasks can be lost if not completed before consumer termination.
- **Acknowledgments**
  - RabbitMQ uses acknowledgments to confirm message processing.
- **Consumer Death**
  - If a consumer dies without acknowledgment, the message isn’t deleted.
- **Redelivery**
  - Unacknowledged messages are redelivered to other consumers.
- **Timeout**
  - A 30-minute default timeout is applied to acknowledgments.

Exchange Types

- Fanout
- Direct
- Topic
- Headers

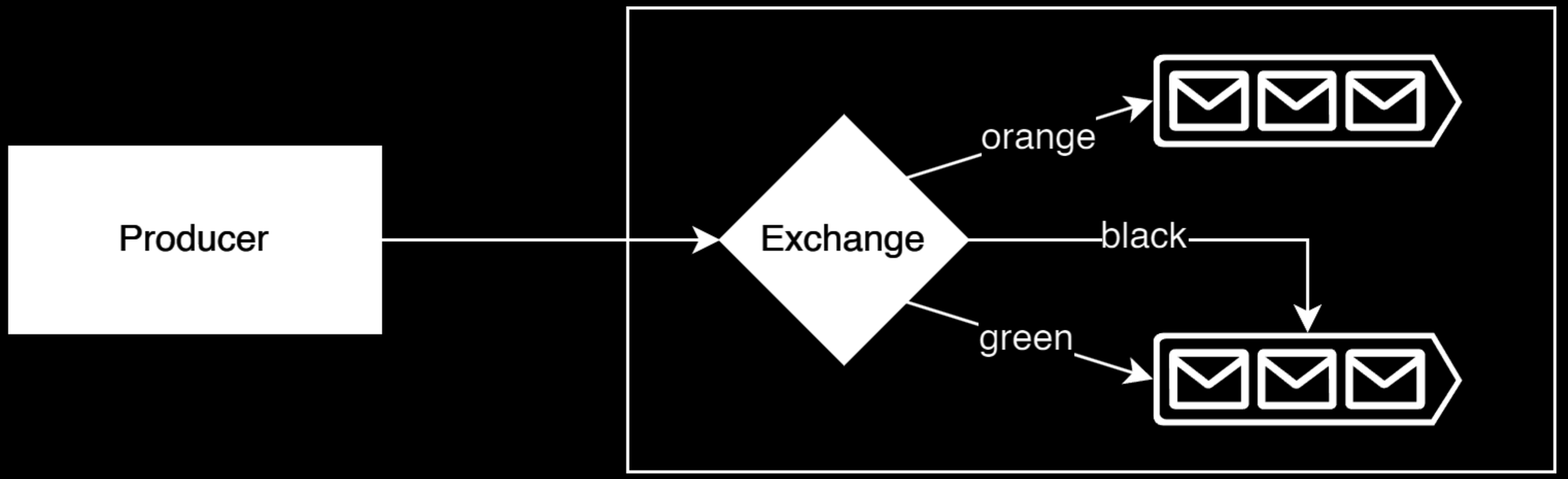
Fanout

It broadcasts all the messages it receives to all the queues it knows.
That relationship between exchange and a queue is called a binding.



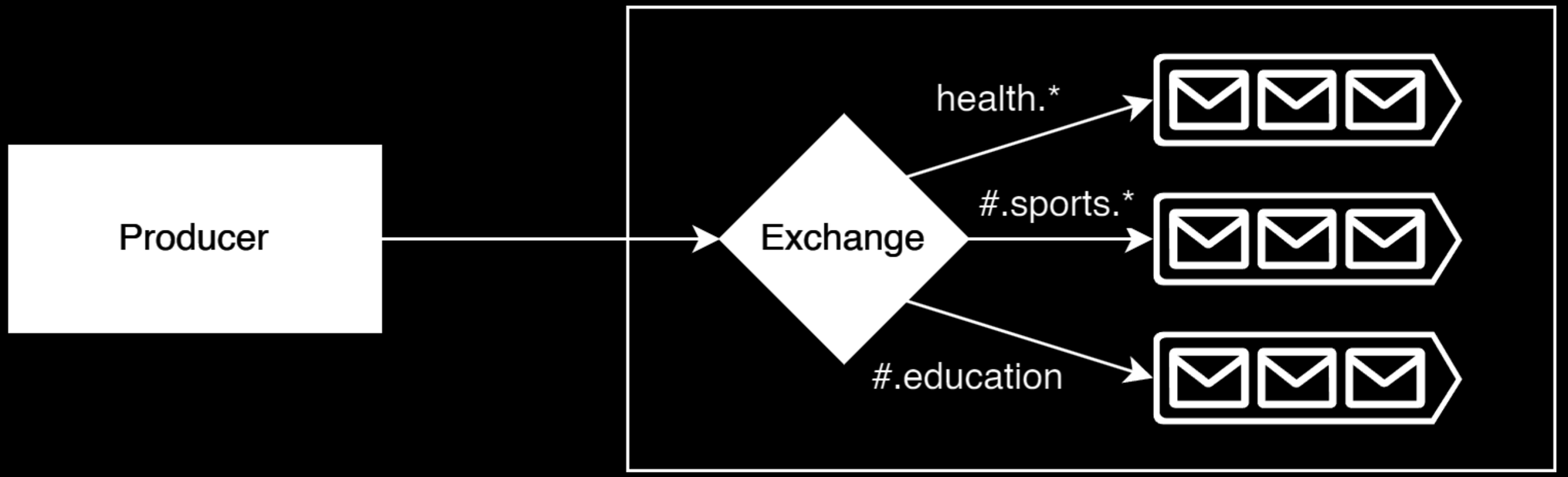
Direct

Queue Q1 is bound with the key orange.
Queue Q2 is bound with two keys: black and green.
Messages with key orange are routed to Q1.
Messages with keys black or green are routed to Q2.
Messages with other keys are discarded.



Topic

Queues are bound with routing key patterns.
The symbol asterisk (*) represents exactly one word.
The symbol hash (#) represents zero or more words.
Multiple key terms are separated by a dot delimiter



Topic Exchange Message Flow

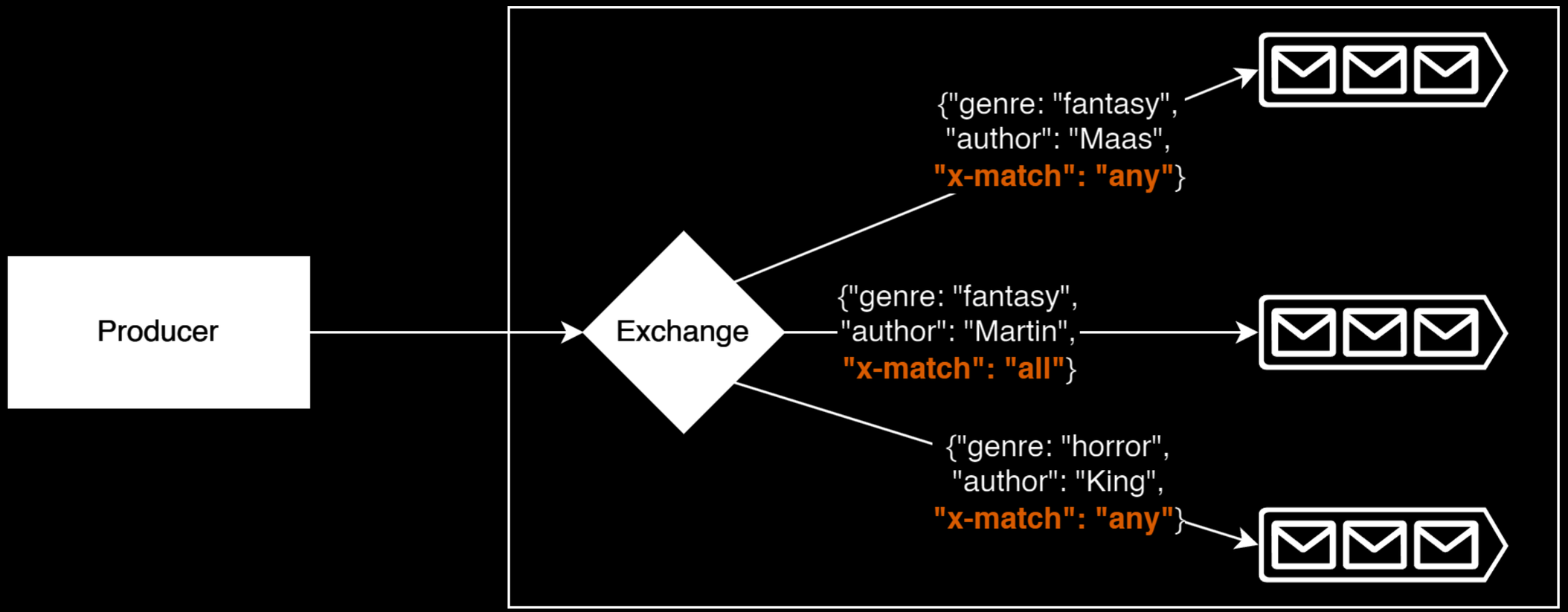
- A message queue binds to an exchange using a routing key pattern (P).
- A publisher sends a message with a routing key (K) to the Topic Exchange.
- If P matches with K, the message is passed to the queue.
- The consumer subscribing to the queue then receives the message.

Routing Pattern Matching Examples

Routing Key Pattern	Reach	Does Not Reach
health.* health as the first word followed by exactly one word.	health.education health.sports health.anything	health health.education.anything health.education.sports
#.sports.* Zero or more words, followed by sports, and then exactly one word.	sports.anything sports.sports.sports sports.sports	sports education.sports anything.sports.anything.xyz
#.education Zero or more words followed by the word education.	health.education anything.xyz.education education	education.health anything.education.anything

Header

x-match: “all” ___ All the header properties should match.
x-match: “any” ___ At least one header property should match.



Further Resources

- Advanced Message Queuing Protocol