

Message Queue Fundamentals in .NET

Introducing Message Queues

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pluralsight 
hardcore dev and IT training

Introducing Message Queues

Asynchronous
communication

Improved
performance and
scalability

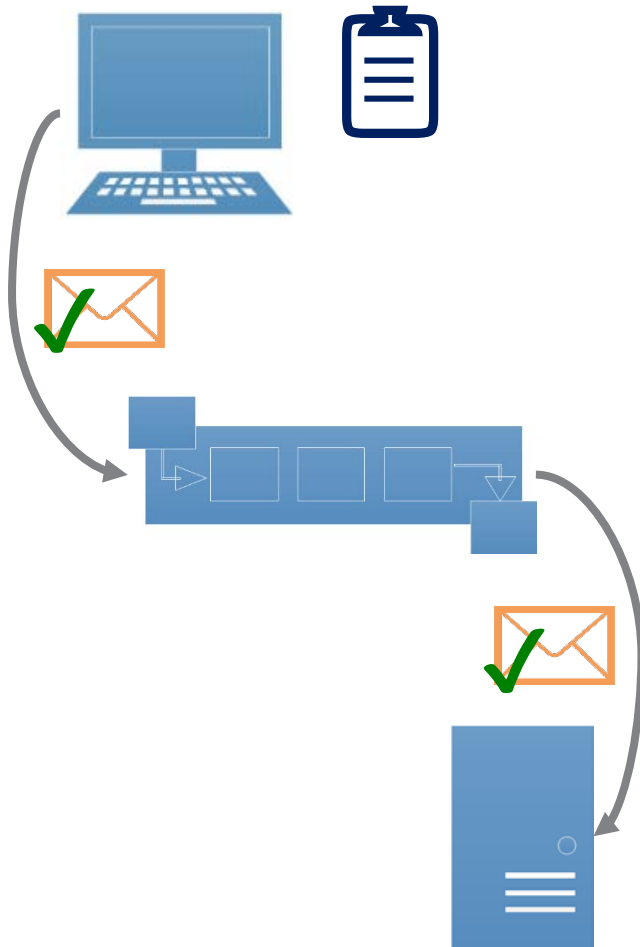
Enhanced
reliability

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Introducing Message Queues



Client packages work request

Sends message to queue

Carries on with other work

Handler retrieves message

Processes work

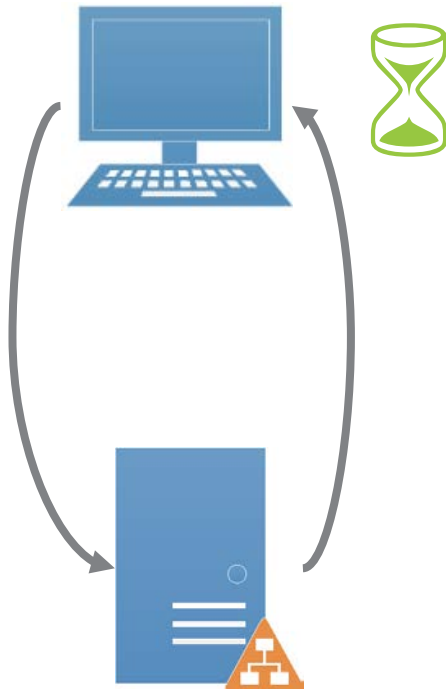
Handler confirms message complete

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Introducing Message Queues



Client sends request

Keeps connection open

Service processes work

Client waits for response

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Introducing Message Queues



Client sends request

Keeps connection open

Service processes work

Client waits for response



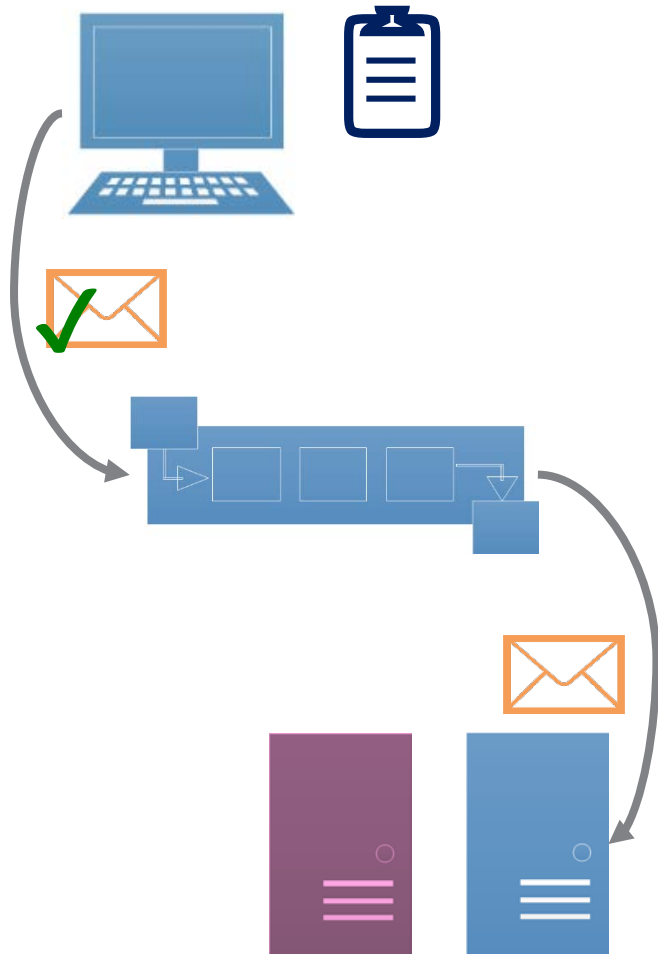
Service sends response

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Introducing Message Queues



Client sends message to queue

Carries on with other work

Handler retrieves message

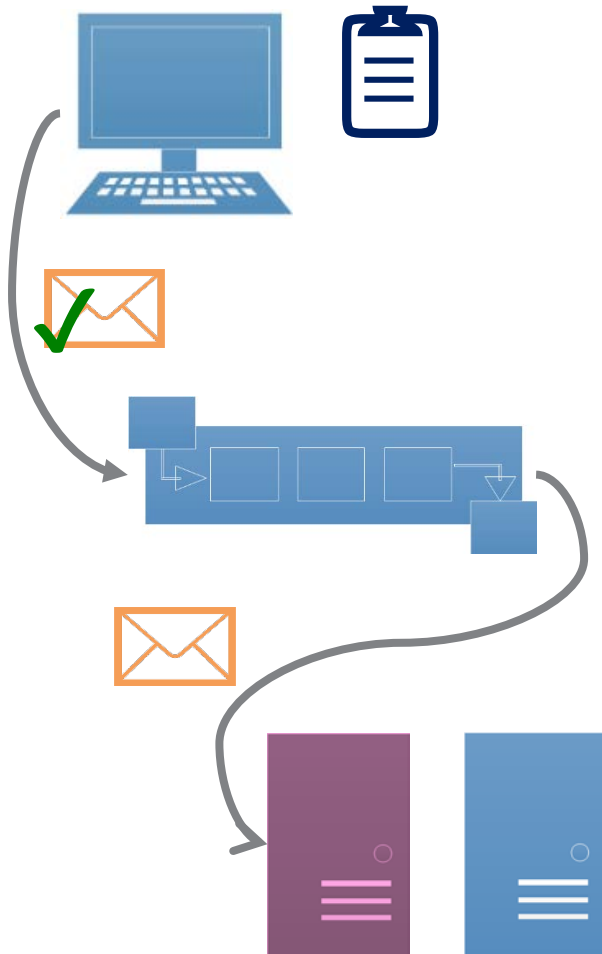
Any system which can talk to the queue

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Introducing Message Queues



Client sends message to queue

Carries on with other work

Handler retrieves message

Any system which can talk to the queue

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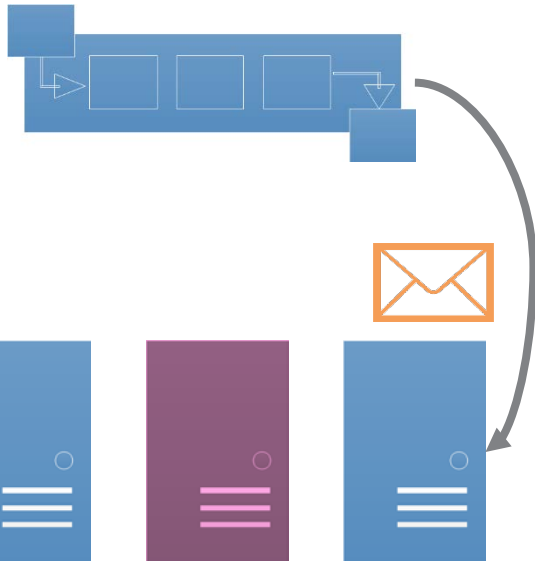
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Introducing Message Queues



Client sends message to queue

Carries on with other work



Handler retrieves message

Any system which can talk to the queue

Any handler which has capacity

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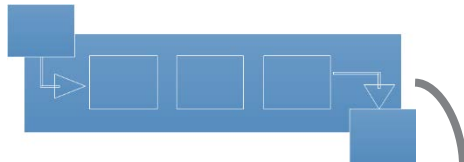
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Introducing Message Queues



Client sends message to queue

Carries on with other work



Handler retrieves message

Any system which can talk to the queue

Any handler which has capacity



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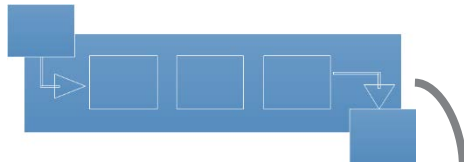
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Introducing Message Queues



Client sends message to queue

Carries on with other work



Handler retrieves message

Any system which can talk to the queue

Any handler which has capacity

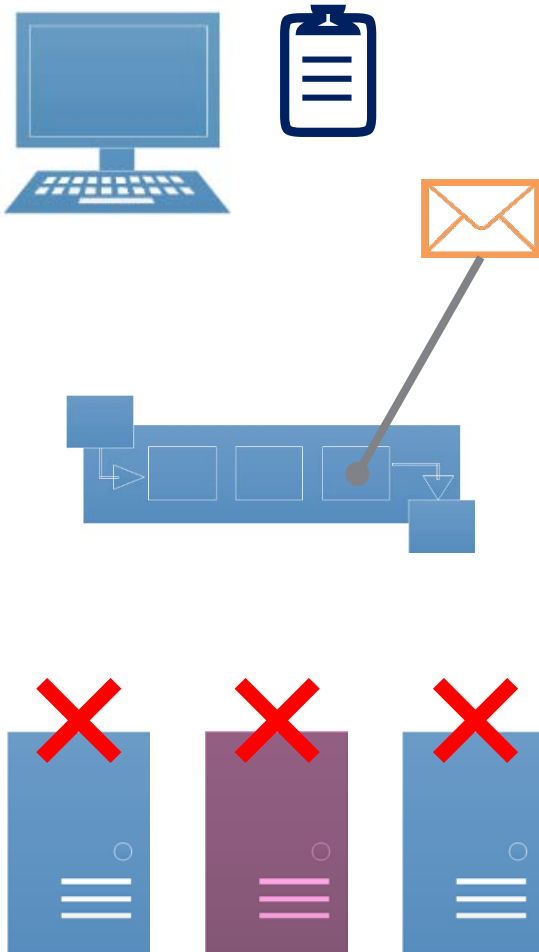


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Introducing Message Queues



Client sends message to queue

Carries on with other work

Handler retrieves message

Any system which can talk to the queue

Any handler which has capacity

Message kept until handler available

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Course Outline

Introducing
Message
Queues

Message
Queue PoC

MSMQ

ZeroMQ

Cloud Message
Queues
(Azure & AWS)

WebSphere MQ

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Goals

Messaging and asynchronous communication

Performance, scalability, reliability

Key messaging patterns

Fire-and-forget, request-response, publish-subscribe

Message queue features

Speed, durability, accessibility, interoperability

Message queue options

MSMQ, ZeroMQ, Azure Service Bus, AWS, WebSphere MQ

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Pre-requisites

Working knowledge
of **.NET** and **C#**

Use of **synchronous
communication**

(Very) Basic
system operations

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message queues

**a.k.a message queuing,
messaging, message-
oriented middleware, MOM**

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Messaging Patterns



Fire-and-forget



Request-response



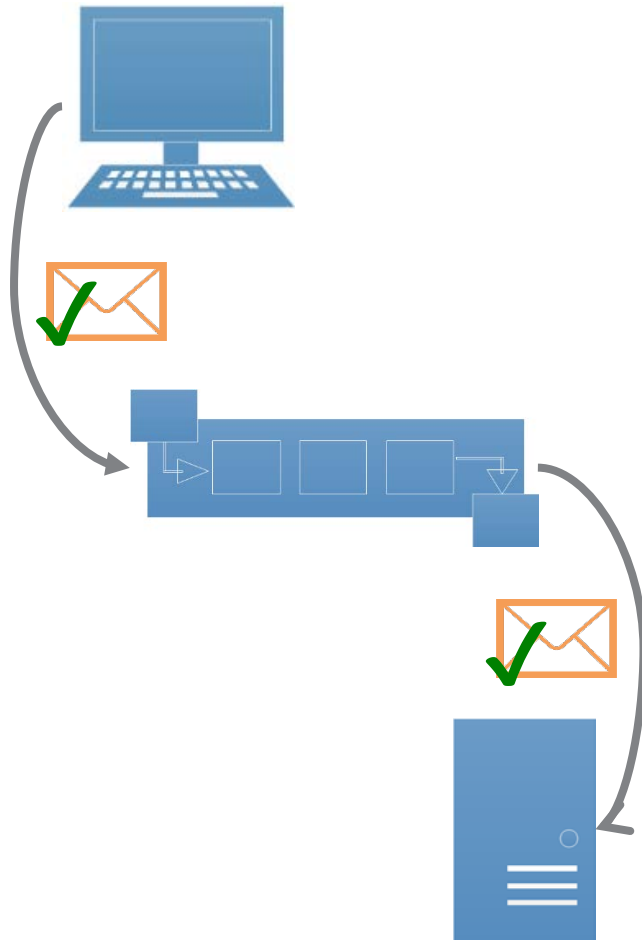
Publish-subscribe

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Messaging Patterns: Fire-and-Forget



Client sends message

Queue confirms receipt

Handler retrieves message

Processes work

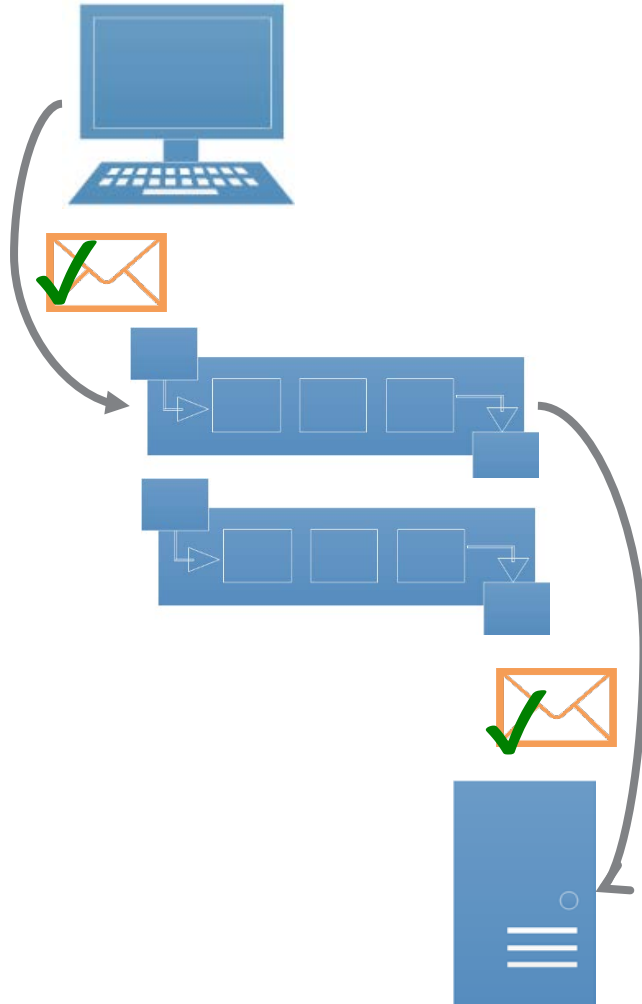
Handler confirms message complete

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Messaging Patterns: Request-Response



Client sends message + reply address

Handler retrieves message

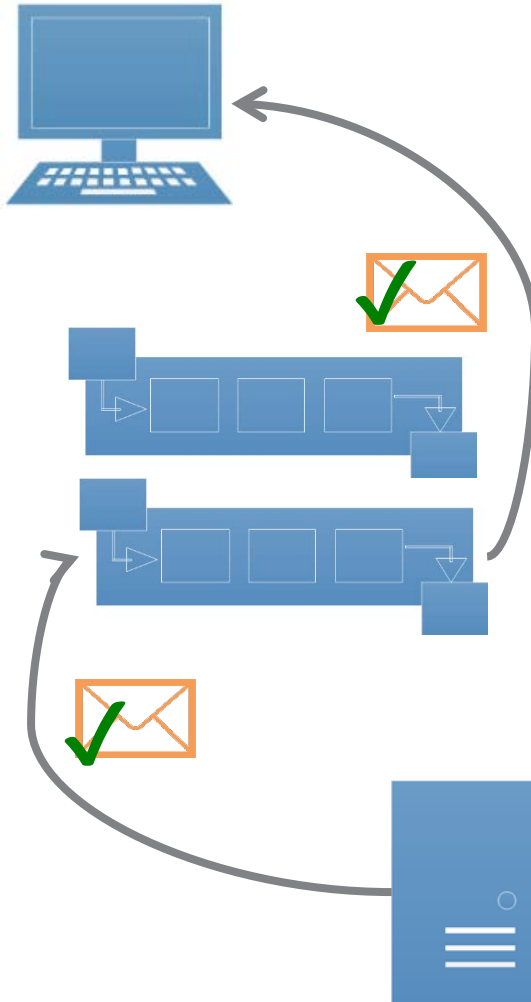
Processes work

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Messaging Patterns: Request-Response



Client sends message + reply address

Handler retrieves message

Processes work

Sends response message

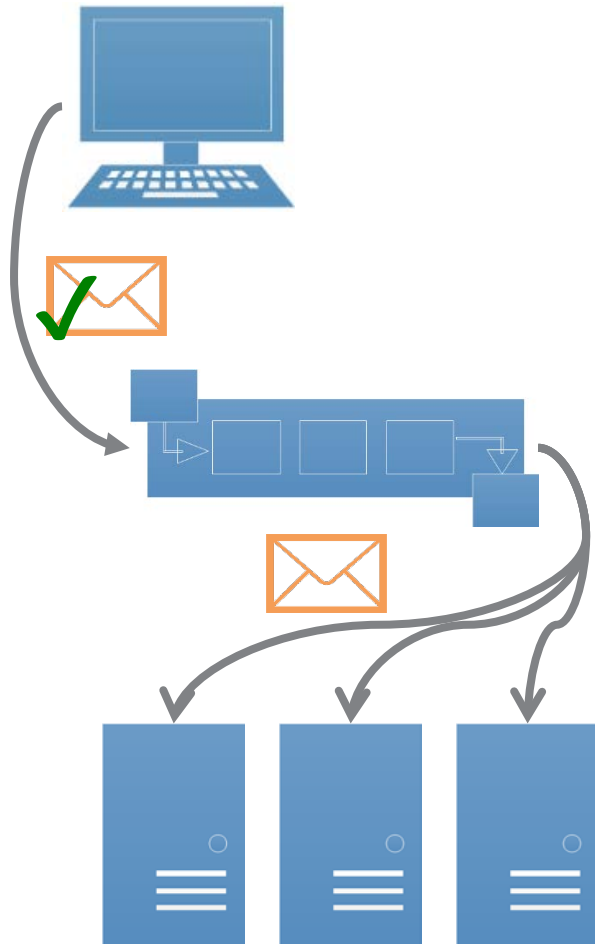
Client retrieves response message

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Messaging Patterns: **Publish-Subscribe**



Subscribers register with queue

Publisher sends message

Queue confirms receipt

Queue forwards message to subscribers

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Messaging Patterns



Fire-and-forget



Request-response



Publish-subscribe

Scatter-Gather

Subscription filters

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Handling Failures

Synchronous

- Open channel between client and server
- Server processing fails
- Client is notified

Asynchronous

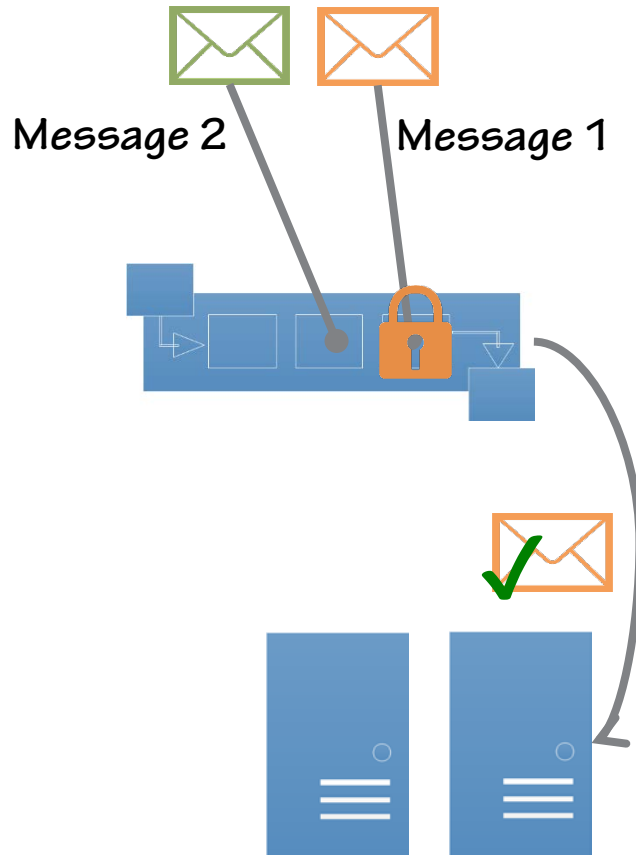
- No direct communication
- Message handler fails
- What happens to the message?

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Handling Failures: Retries



Handler 1 retrieves message 1

Queue locks message 1

But does not remove it

Handler 1 confirms complete

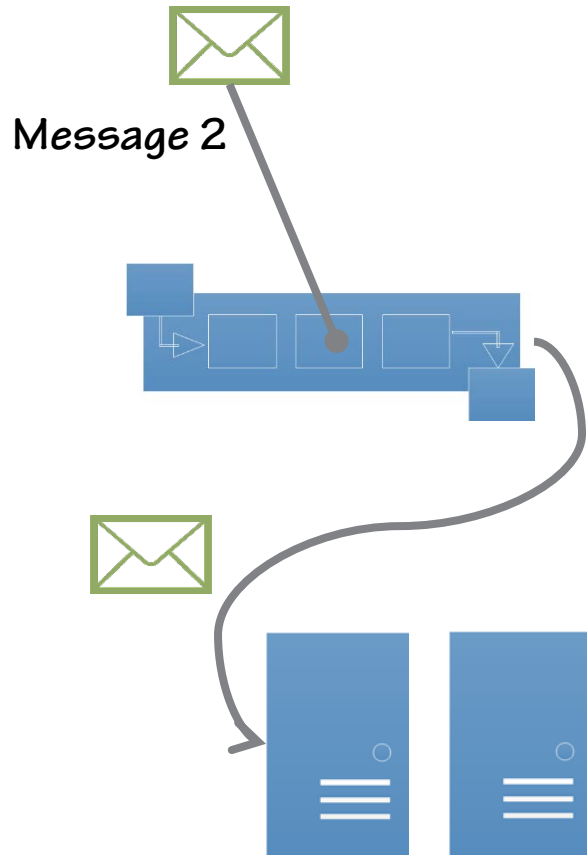
Queue removes message 1

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Handling Failures: Retries



Handler 1 retrieves message 1

Queue locks message 1

But does not remove it

Handler 1 confirms complete

Queue removes message 1

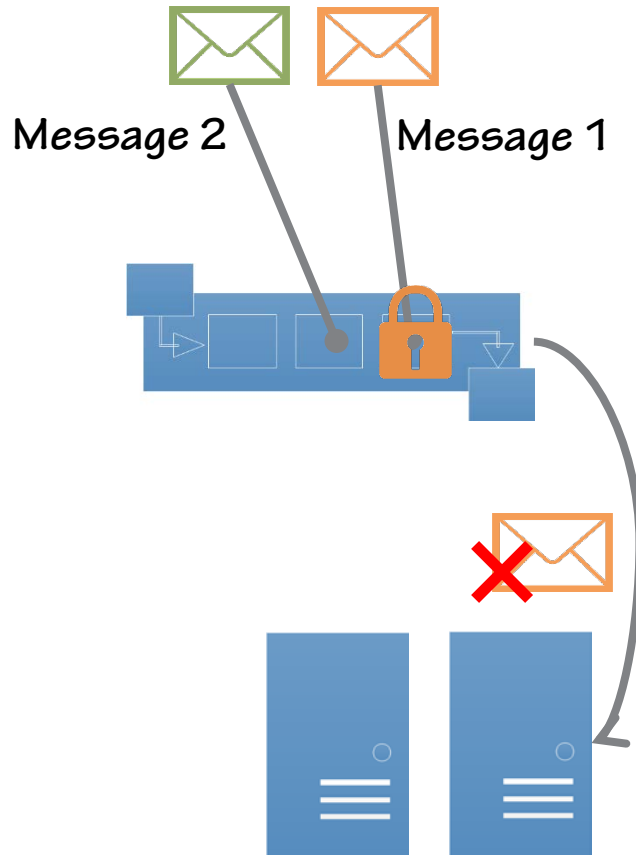
Handler 2 retrieves message 2

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Handling Failures: Retries



Handler 1 retrieves message 1

Queue locks message 1

But does not remove it

Handler 1 confirms failure

Or does not confirm complete in time

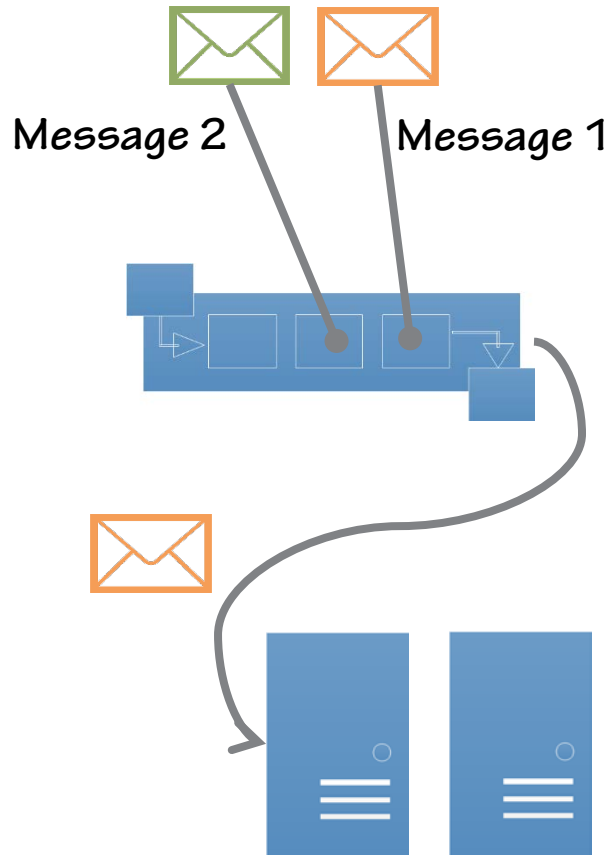
Queue unlocks message 1

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Handling Failures: Retries



Handler 1 retrieves message 1

Queue locks message 1

But does not remove it

Handler 1 confirms failure

Or does not confirm complete in time

Queue unlocks message 1

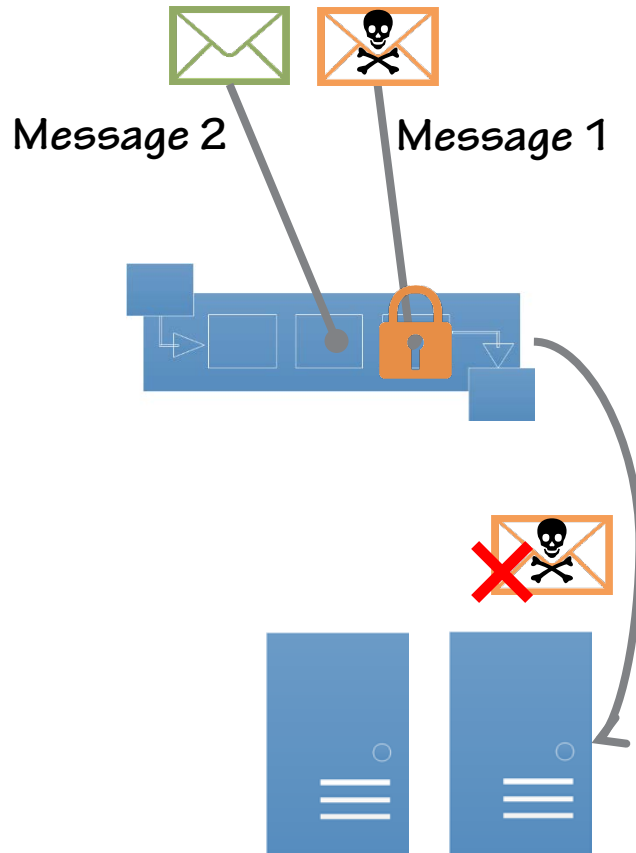
Handler 2 retrieves message 1

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Handling Failures: Poison Messages



Handler 1 retrieves bad message

Queue locks bad message

But does not remove it

Handler 1 confirms failure

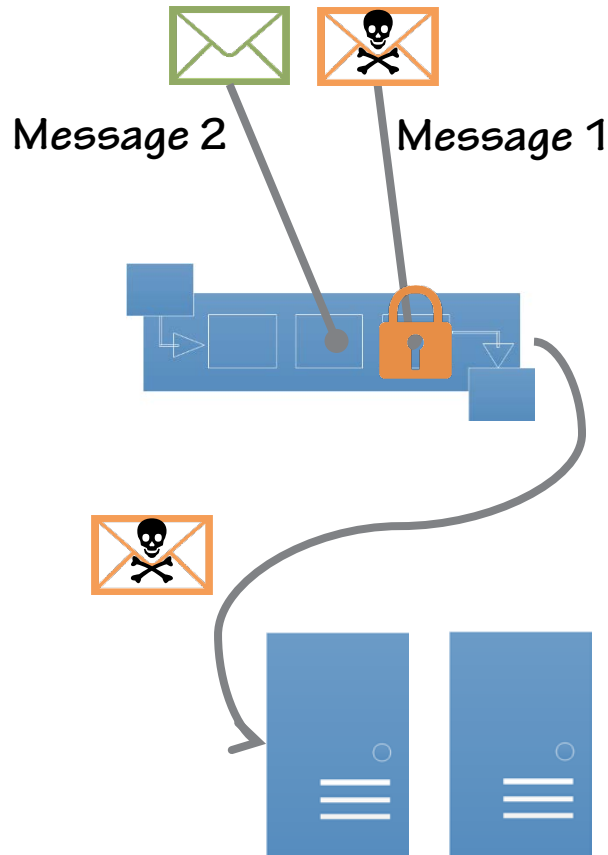
Queue unlocks bad message

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Handling Failures: Poison Messages



Handler 1 retrieves bad message

Queue locks bad message

But does not remove it

Handler 1 confirms failure

Queue unlocks bad message

Handler 2 retrieves bad message

Message 2 never processed

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Handling Failures: Dead-Letter Queue



Handler 1 retrieves bad message

Queue locks bad message
But does not remove it

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Handling Failures: Dead-Letter Queue



Handler 1 retrieves bad message

Queue locks bad message
But does not remove it

Handler 1 detects poison message
Moves to dead-letter queue

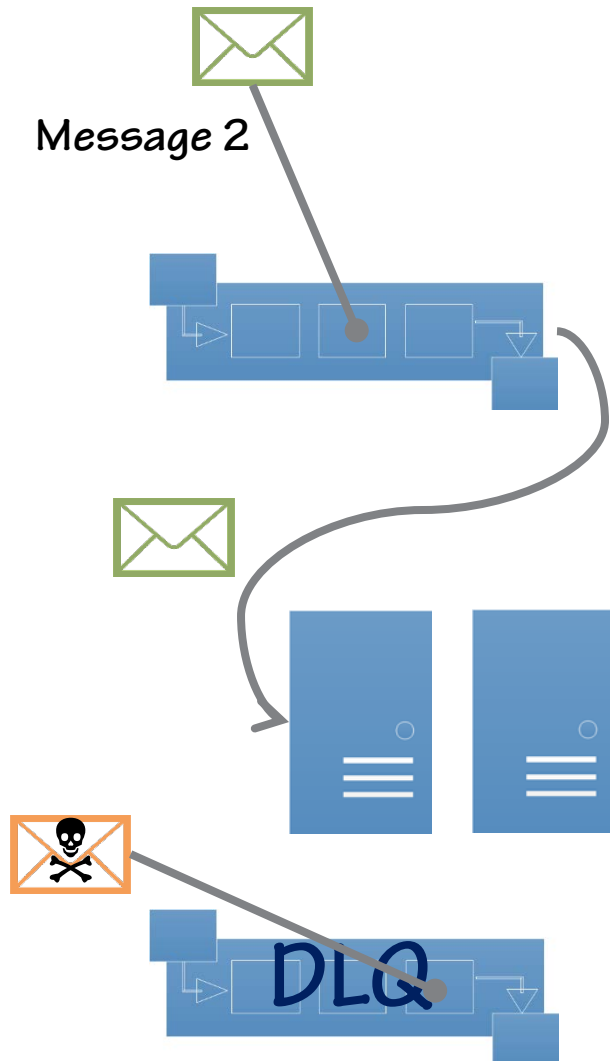
Queue removes bad message

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Handling Failures: Dead-Letter Queue



Handler 1 retrieves bad message

Queue locks bad message

But does not remove it

Handler 1 detects poison message

Moves to dead-letter queue

Queue removes bad message

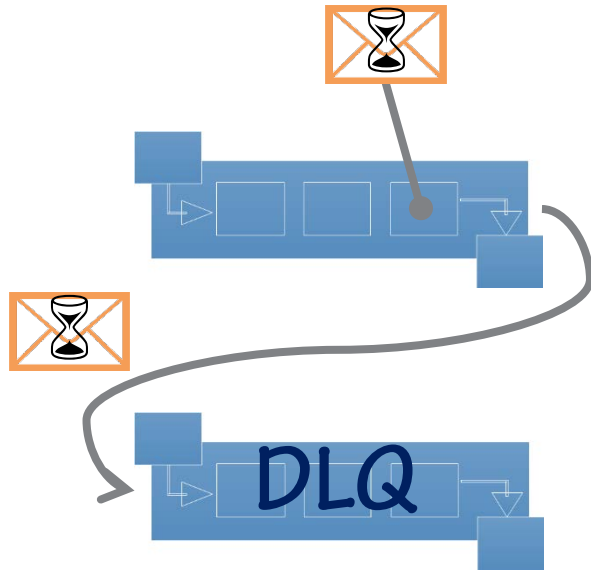
Handler 2 retrieves message 2

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Handling Failures: Dead-Letter Queue



Message queue systems use DLQ

Not via a message handler

MSMQ

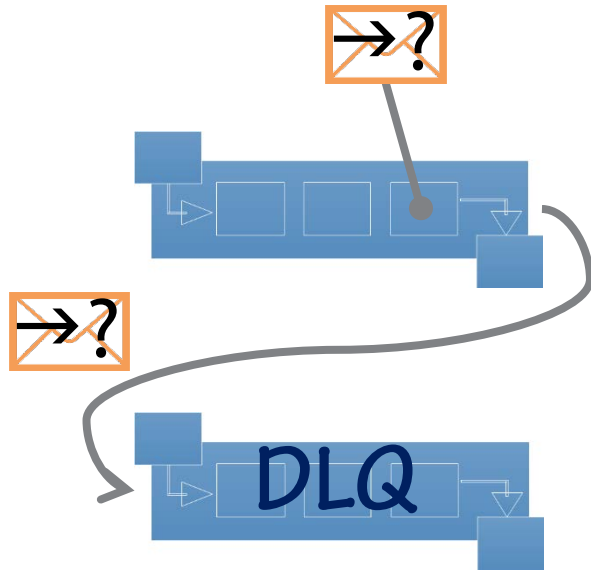
If a message times out

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Handling Failures: Dead-Letter Queue



Message queue systems use DLQ

Not via a message handler

MSMQ

If a message times out

WebSphere MQ




If the destination queue doesn't exist

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Summary

- **Message queues** 
 - Asynchronous communication
- **Messaging patterns** 
 - Fire-and-forget
 - Request-response
 - Publish-subscribe
- **Failed processing** 
 - Retries
 - Poison messages
 - The dead-letter-queue



Message
Queue PoC

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