Building .NET Worker Services

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Overview

Worker services

- Microservice architecture

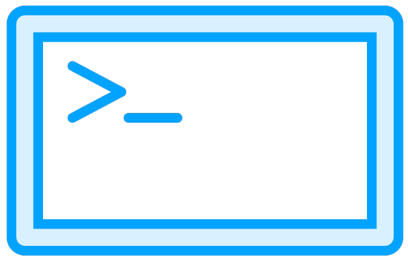
Create a new worker service project

Migrate processing to a worker service

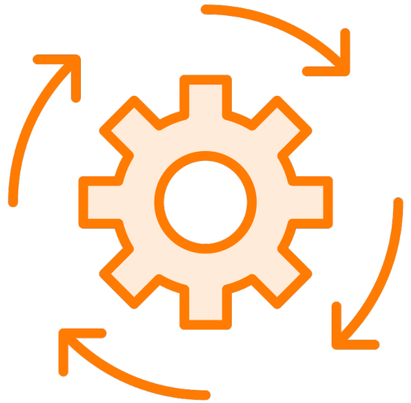
- Poll a message queue
- Load and process the results file
- Refactor the web application

What Are Worker Services?

Worker Services



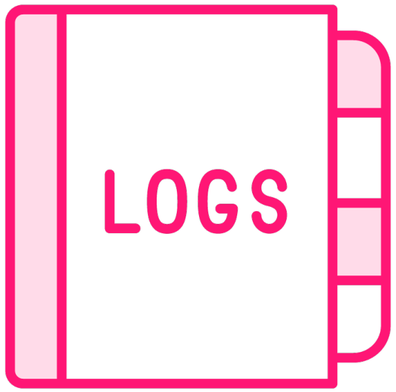
Console application



Hosting supports long-running workloads

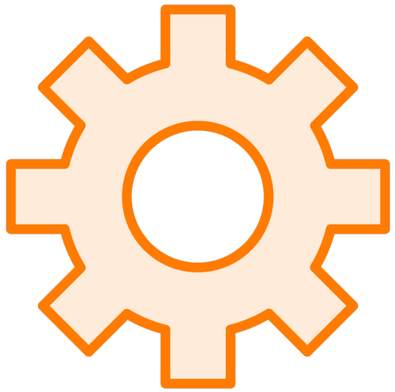
Scheduled workloads

.NET Hosting



Logging

Dependency Injection

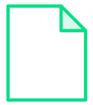


Configuration

Worker services can be applied as a core component to build cloud-native, microservice architectures.

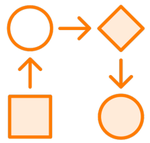
Common Workloads

Processing messages/events from a queue, service bus or event stream



Reacting to file changes in a object/file store

Aggregating data from a data store



Enriching data in data ingestion pipelines

Formatting and cleansing of AI/ML datasets

Create a worker service project

Explore the default project structure

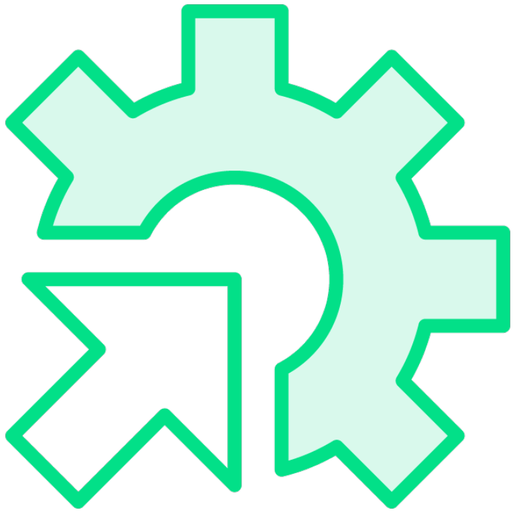
```
dotnet new worker -n “ExampleWorkerService"
```

.NET CLI Command

Creates a new .NET project using the worker service template

Hosting in .NET

Host



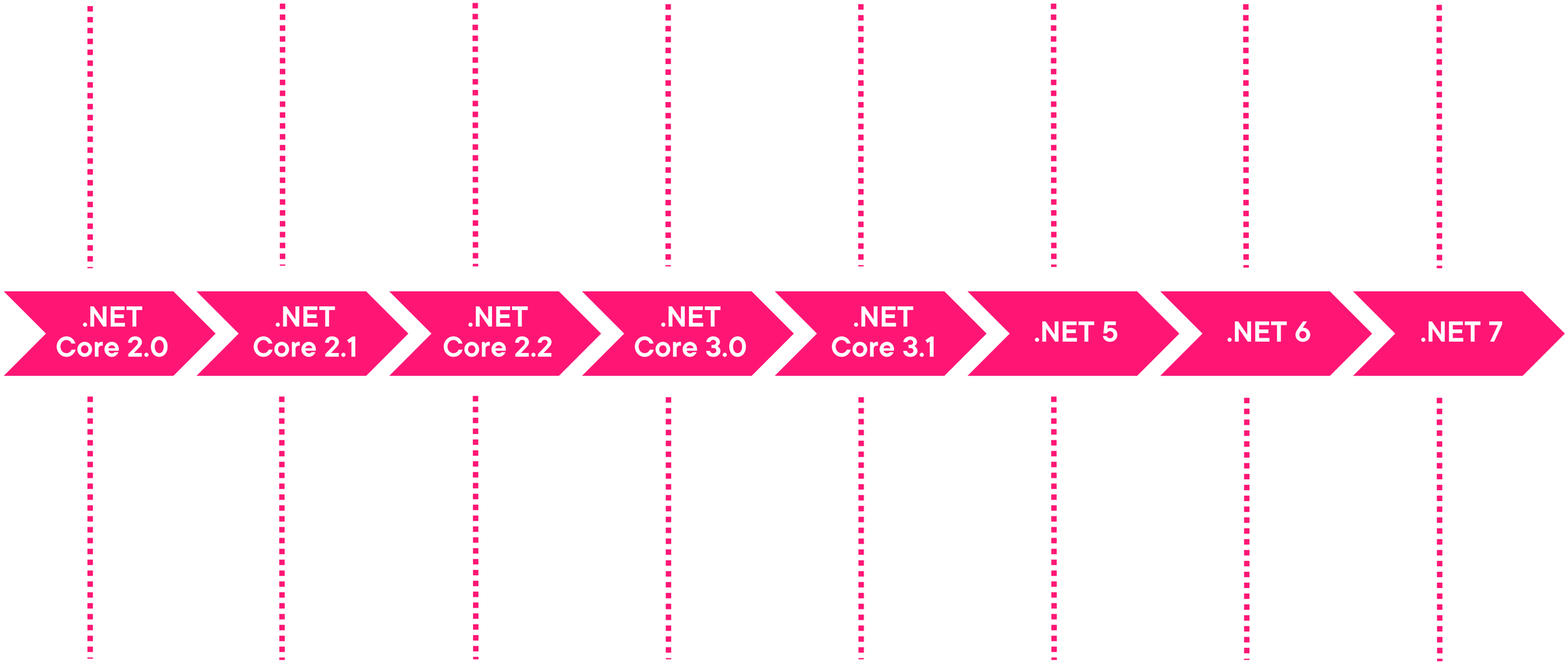
Manages application lifetime

Provides components such as dependency injection, logging and configuration

Turns a console application into a long-running service

Starts and stops hosted services

Hosting History



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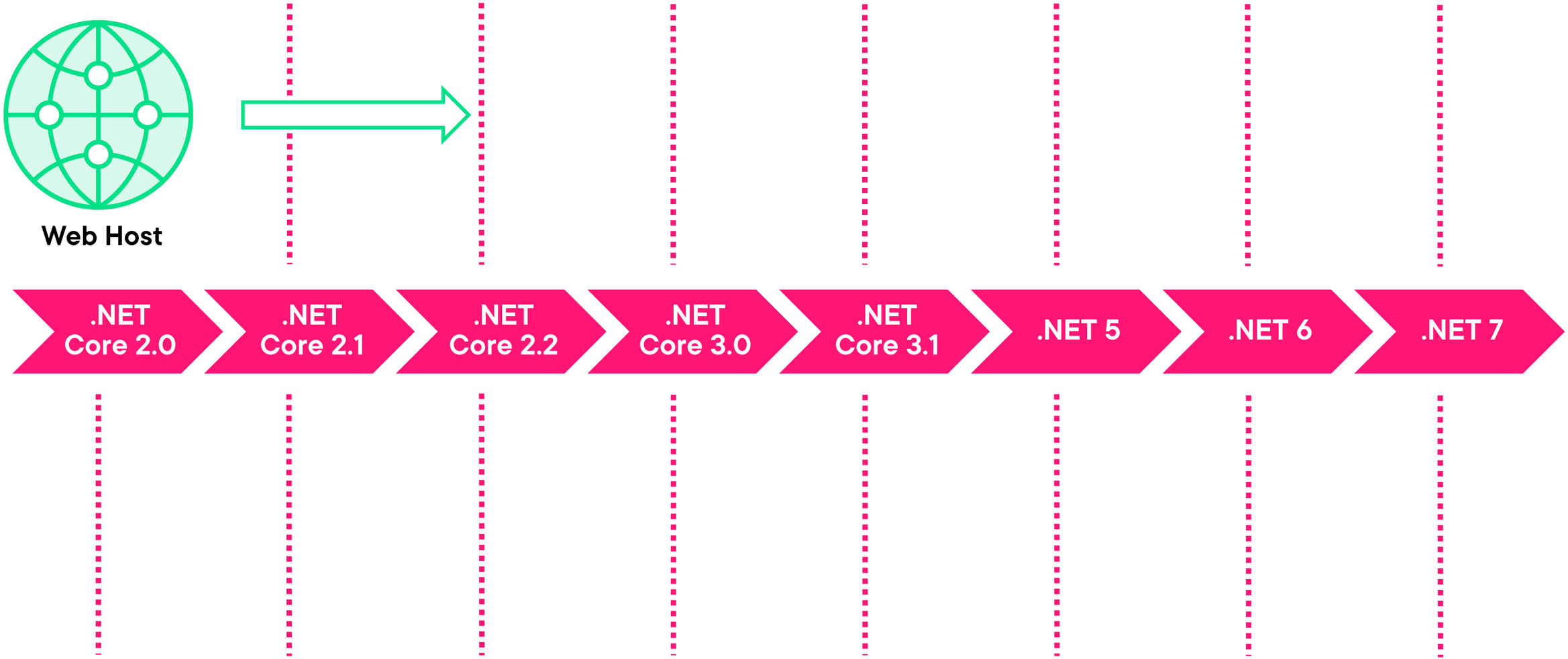

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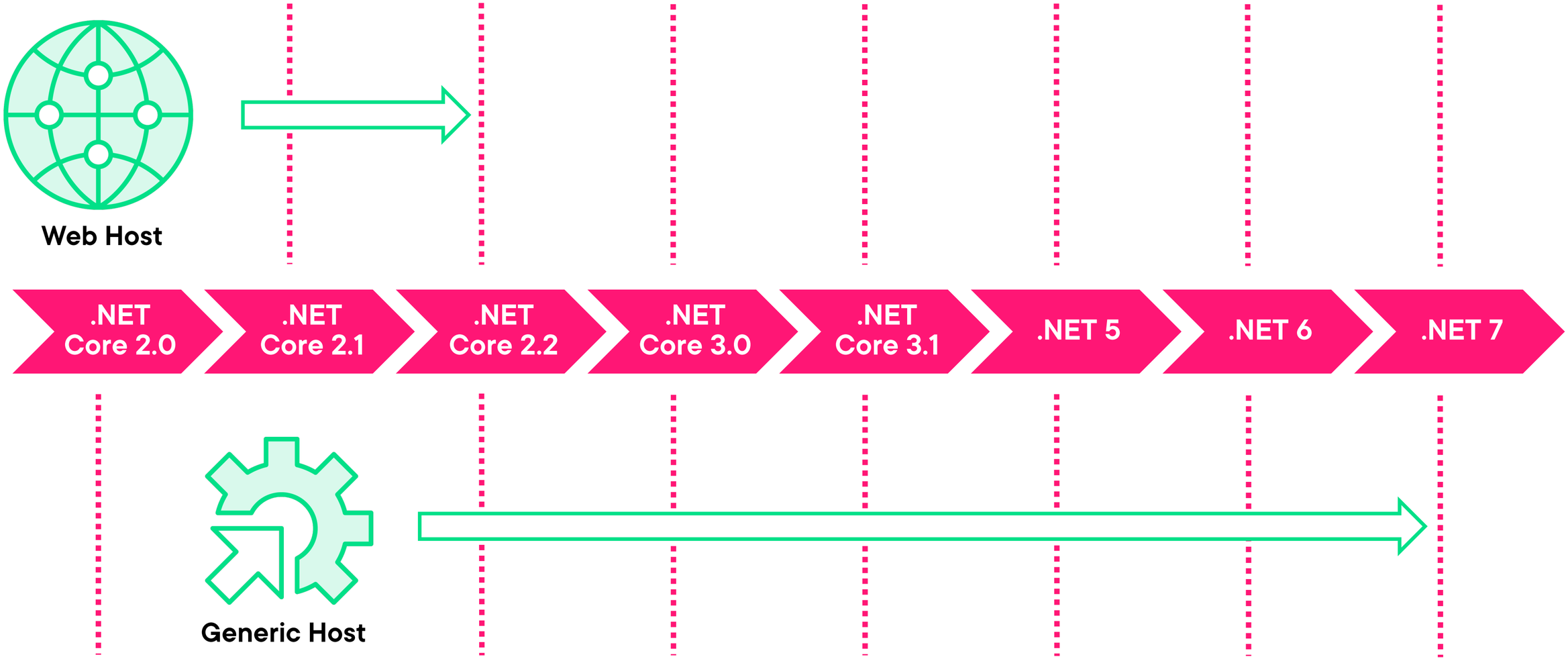

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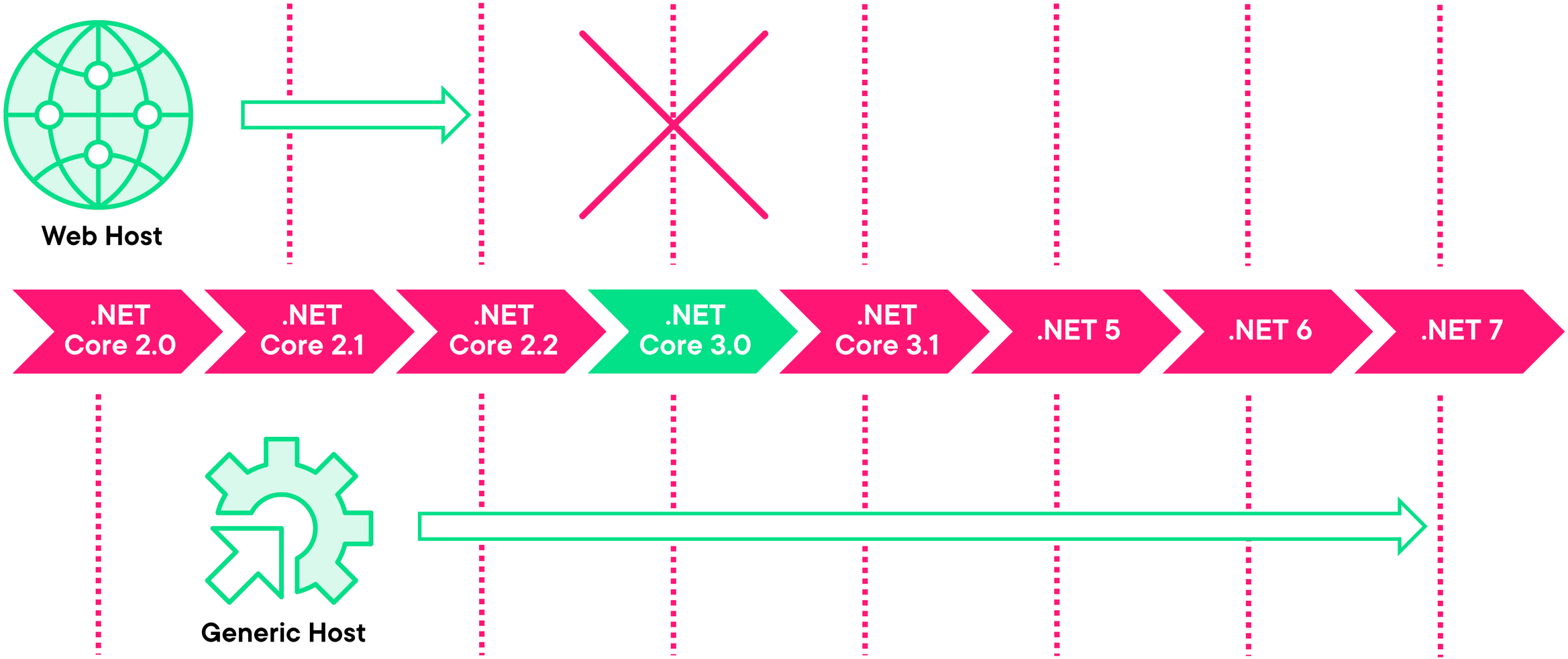

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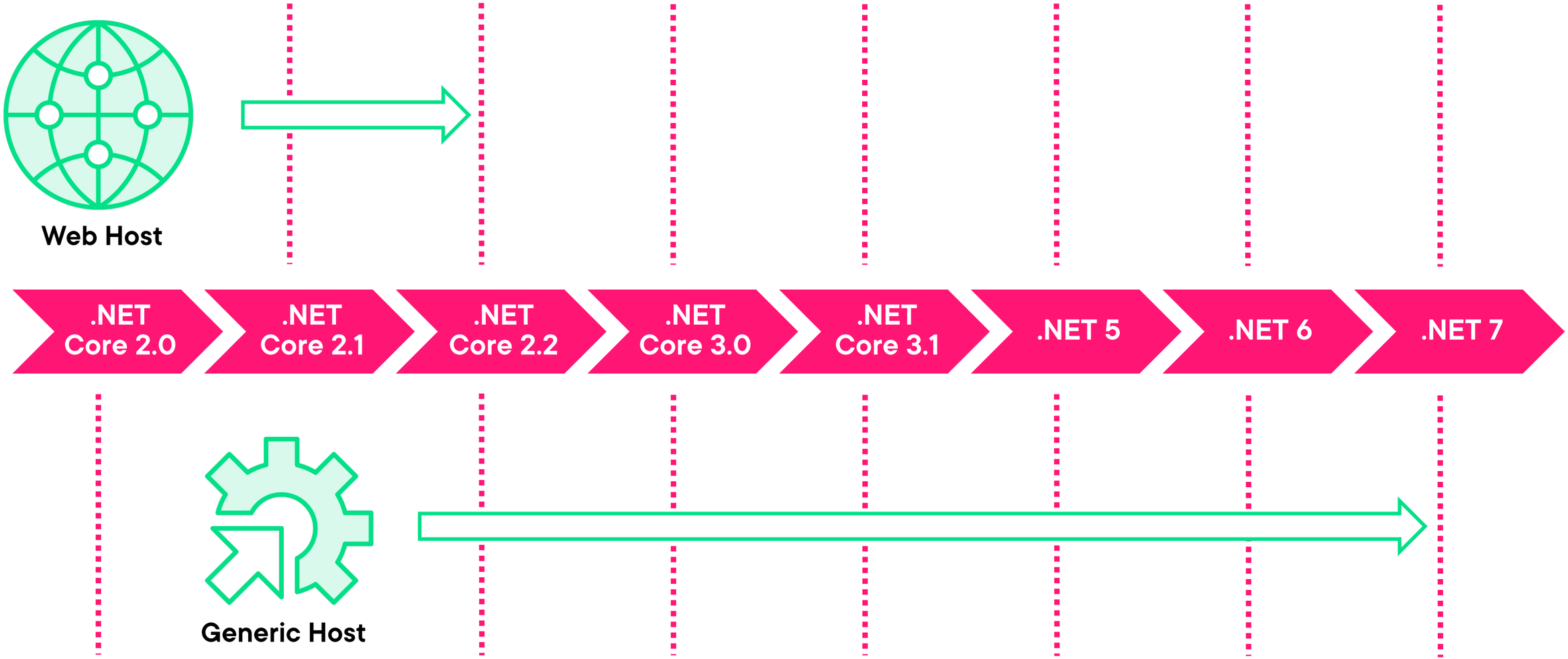

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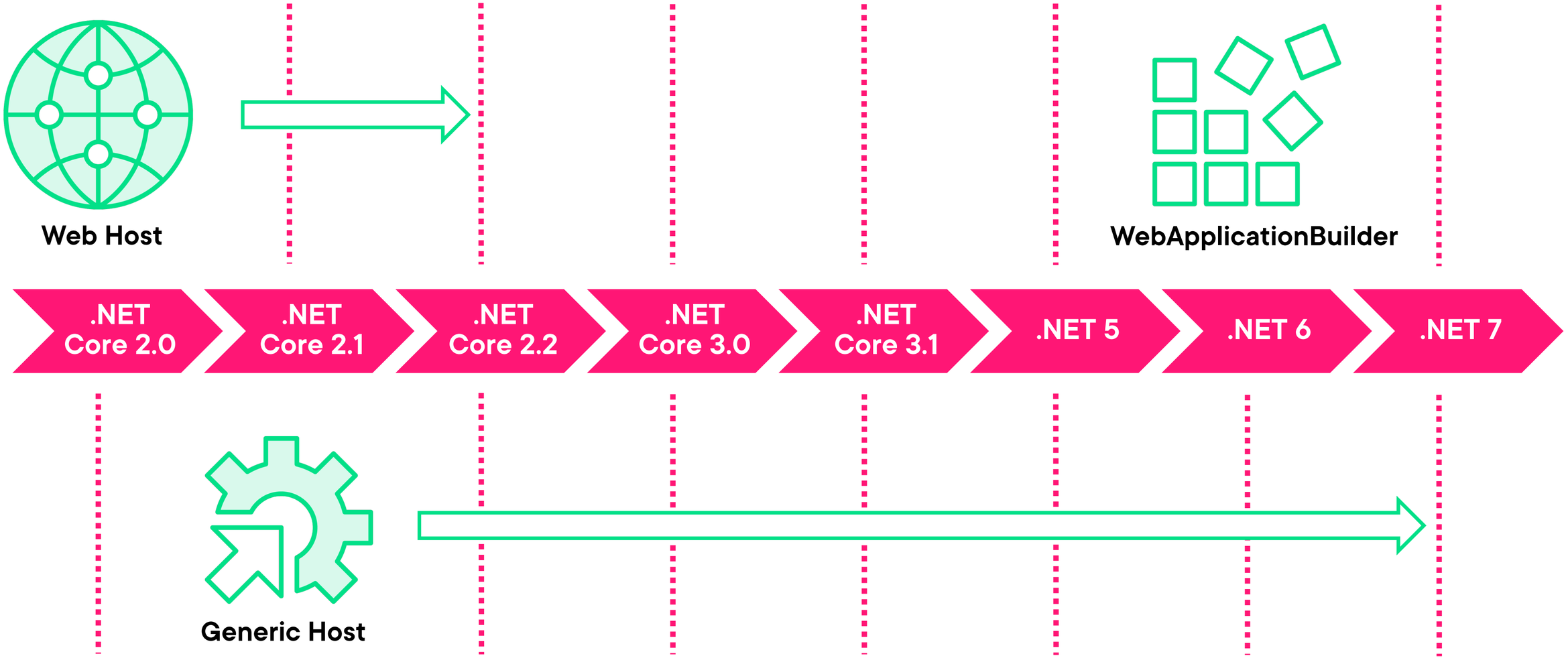


The Kestrel web server is started as a hosted service.

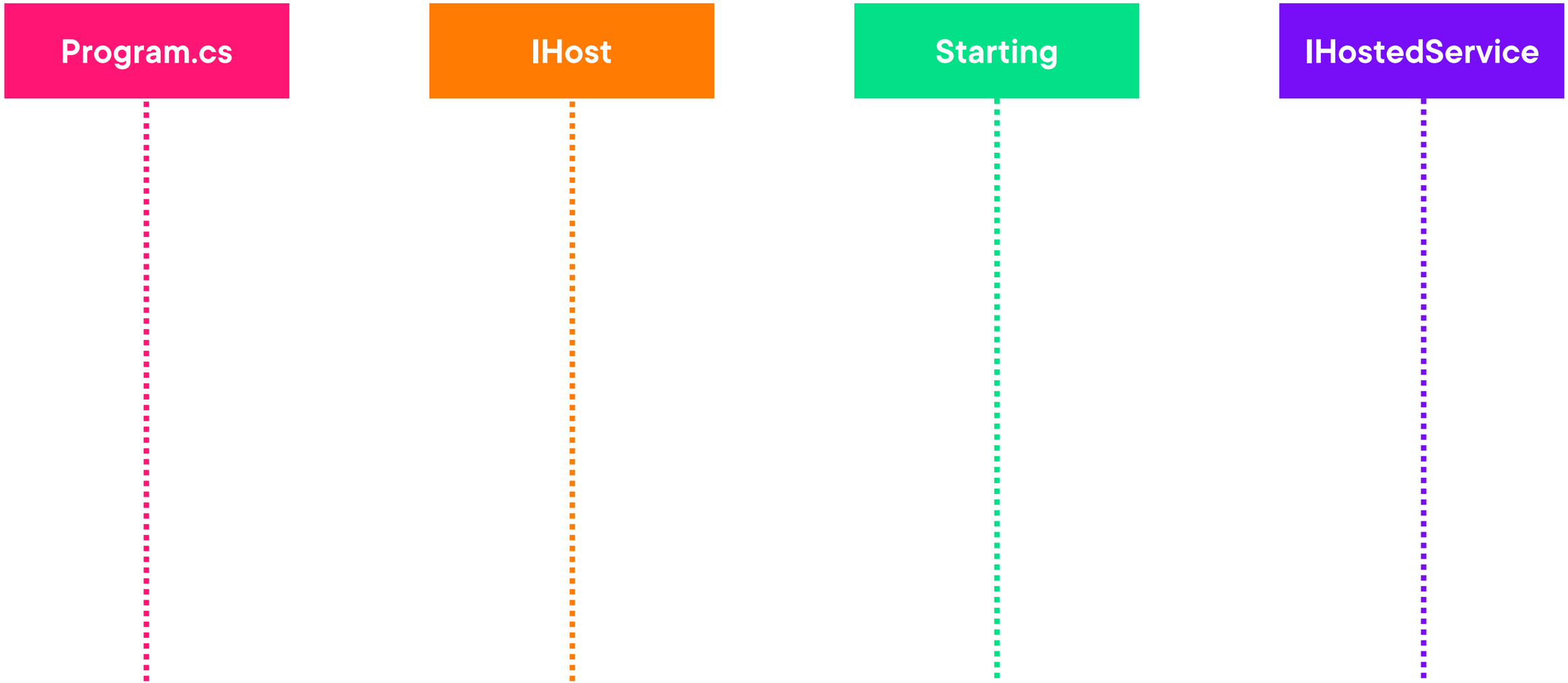
Creating a Host

Program.cs

```
IHost host = Host.CreateDefaultBuilder(args)
    .ConfigureServices(services =>
    {
        services.AddHostedService<Worker>();
    })
    .Build();

await host.RunAsync();
```

Host Startup



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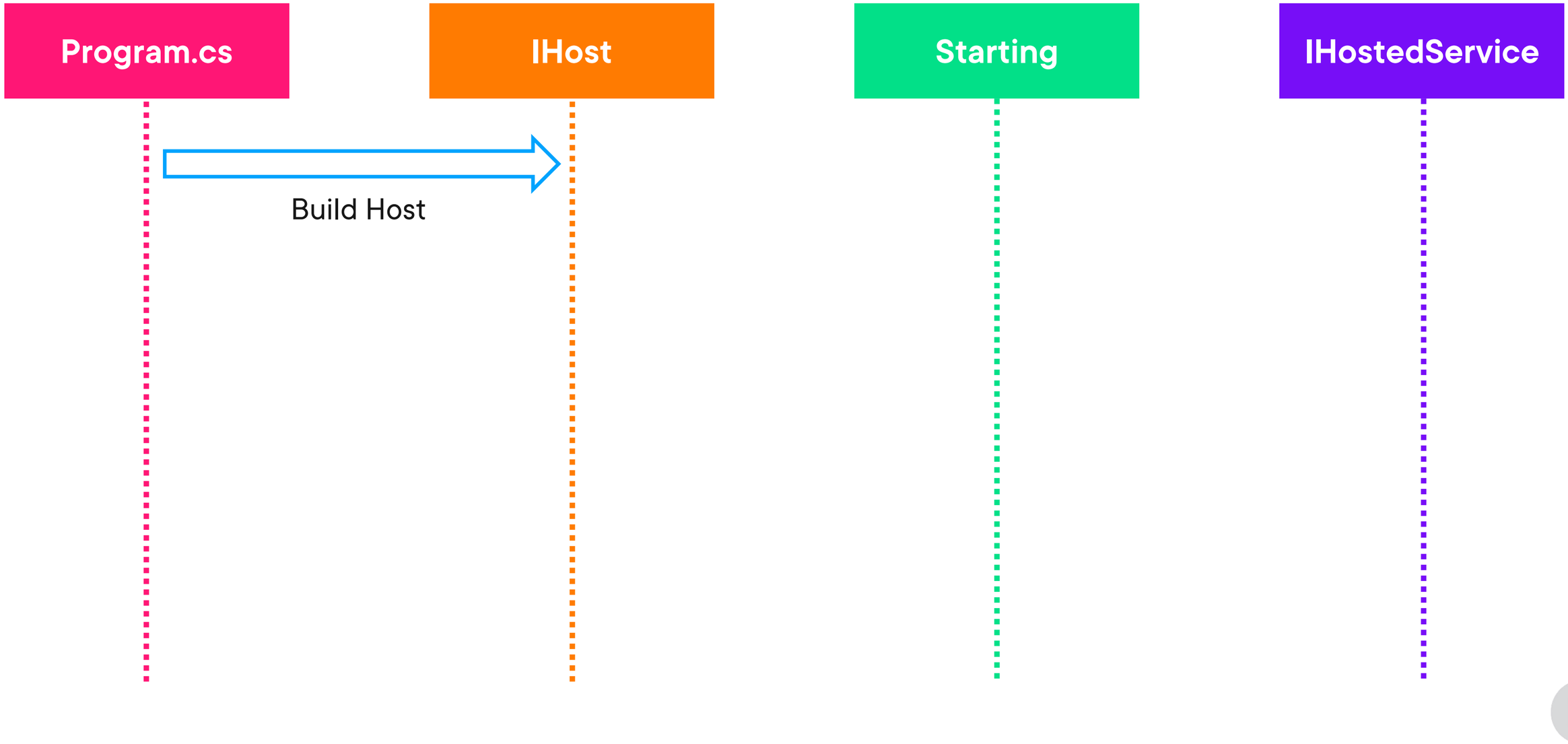

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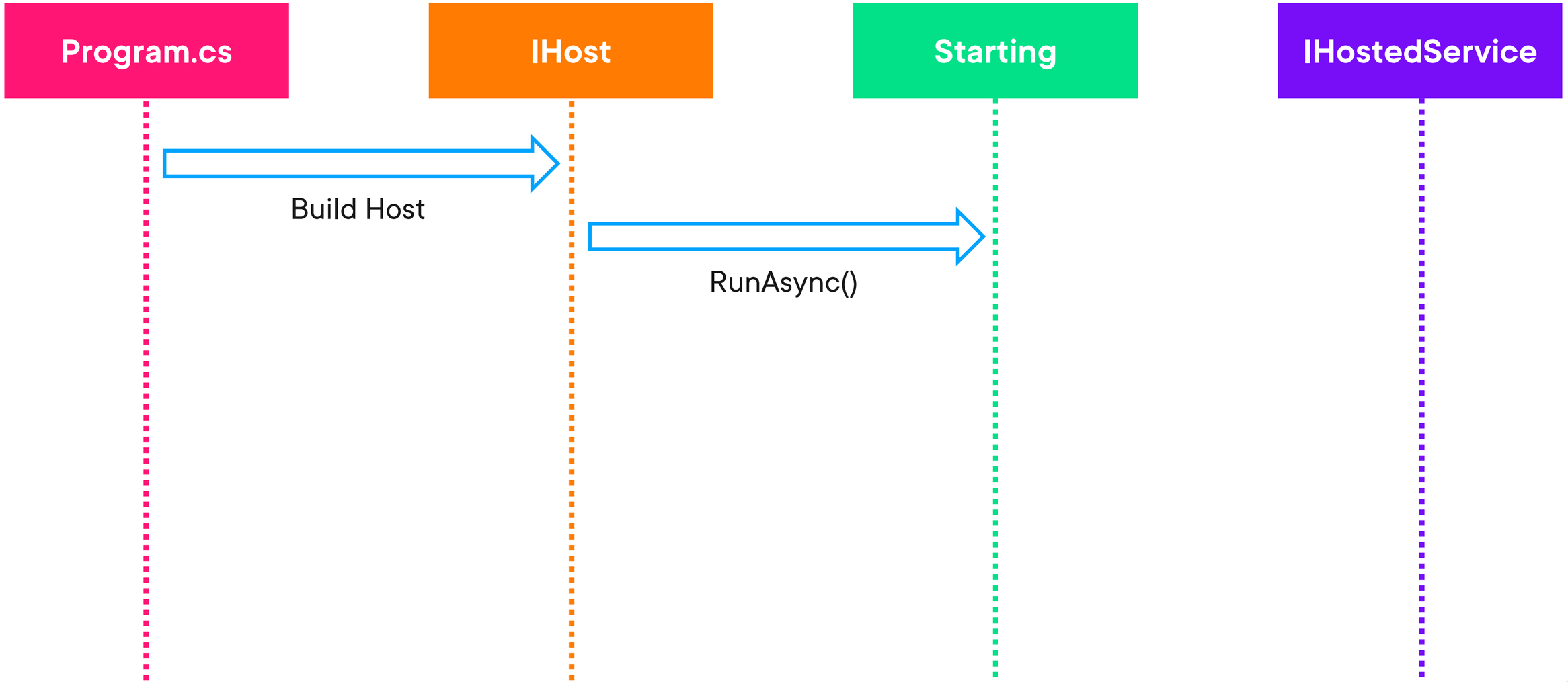

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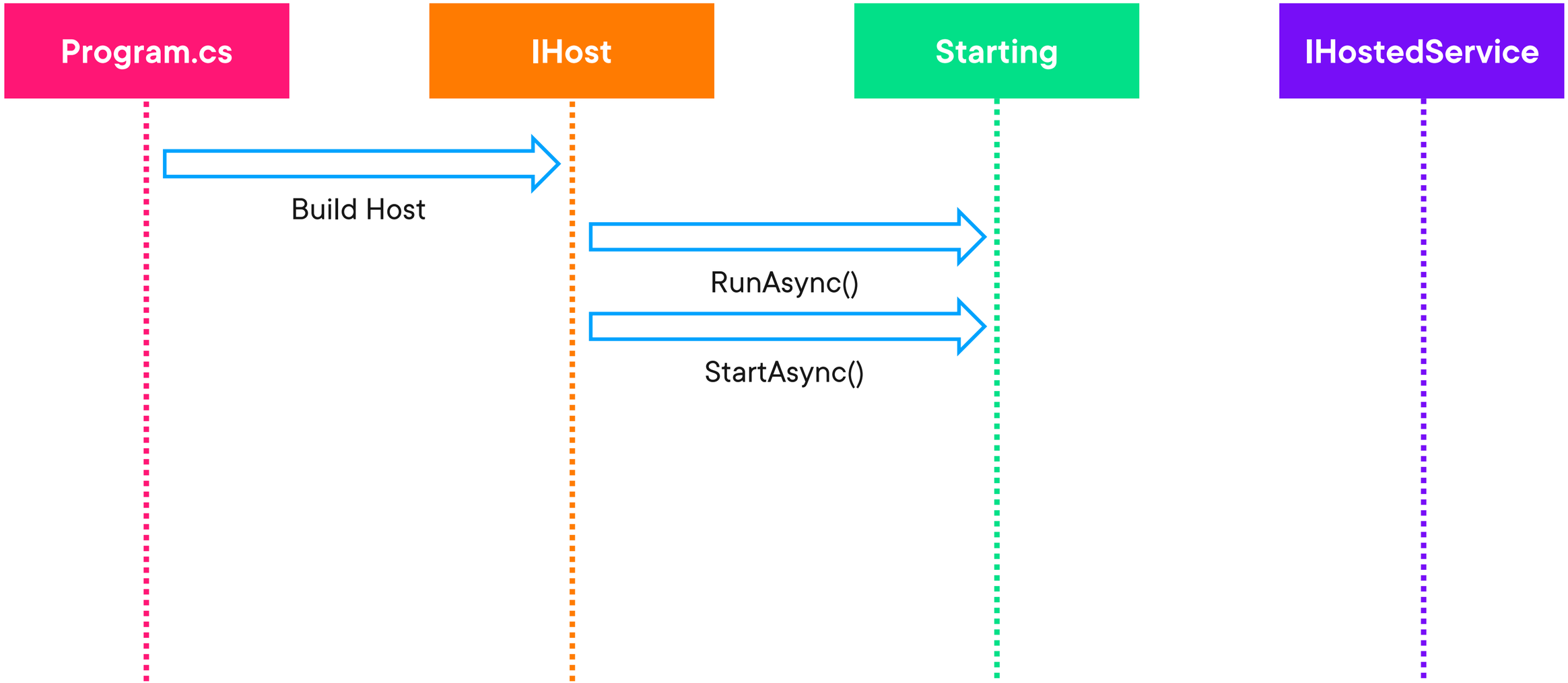

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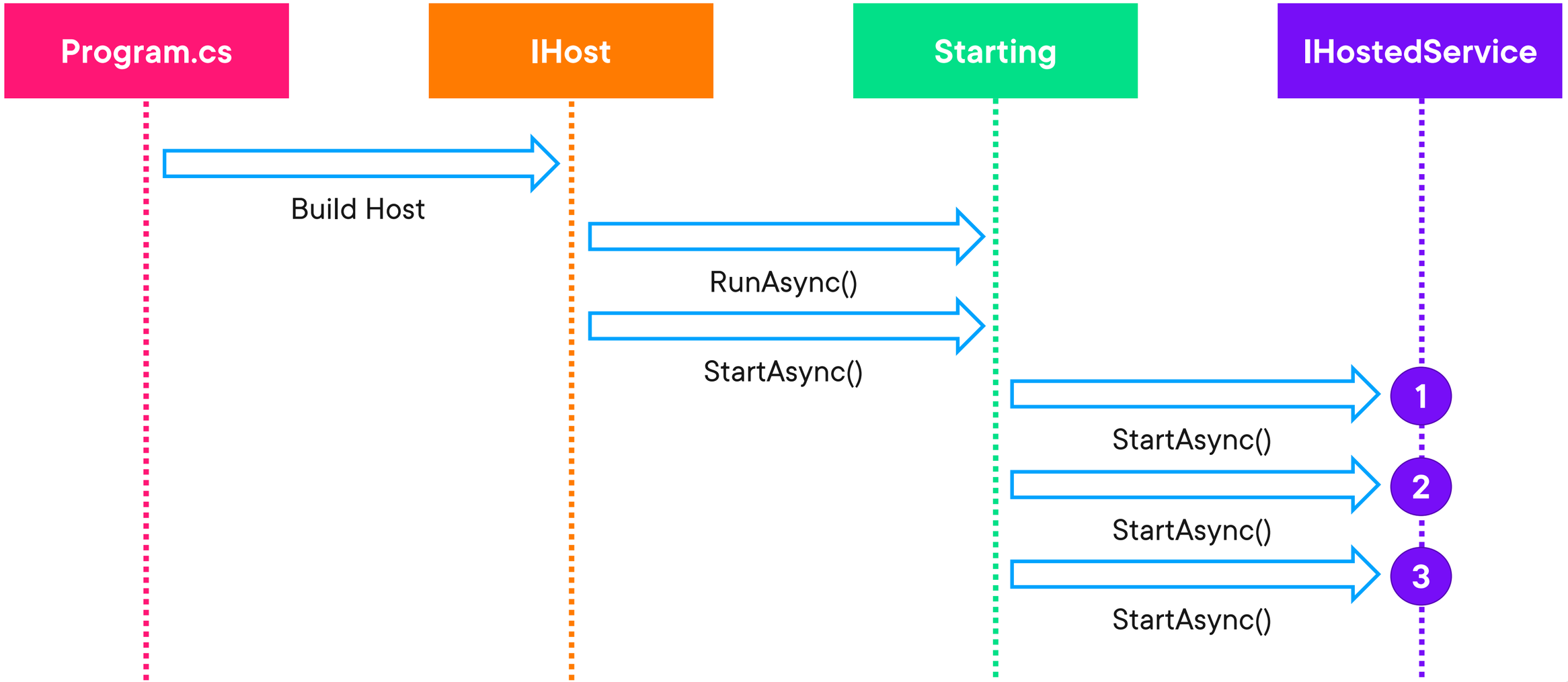

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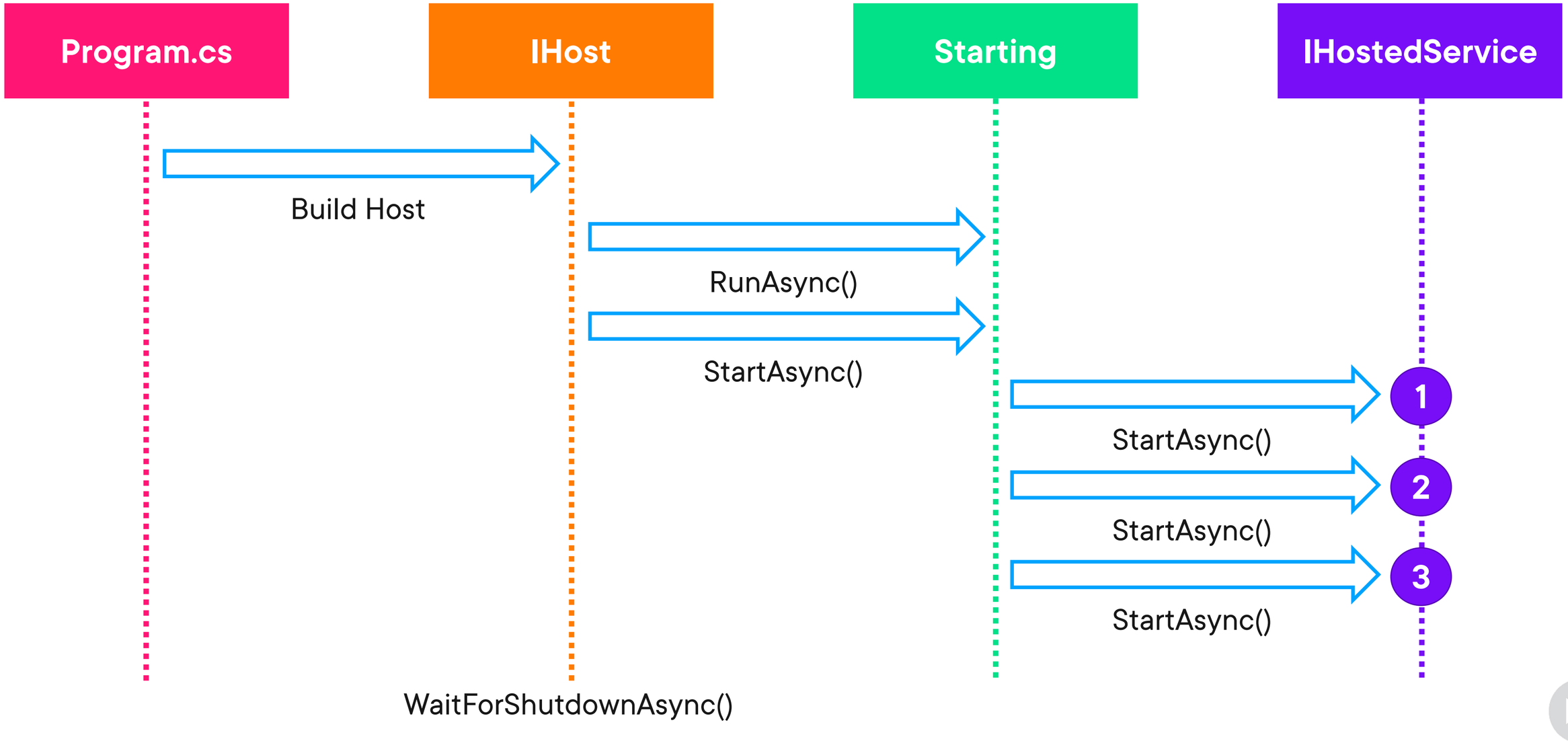


Triggering Shutdown

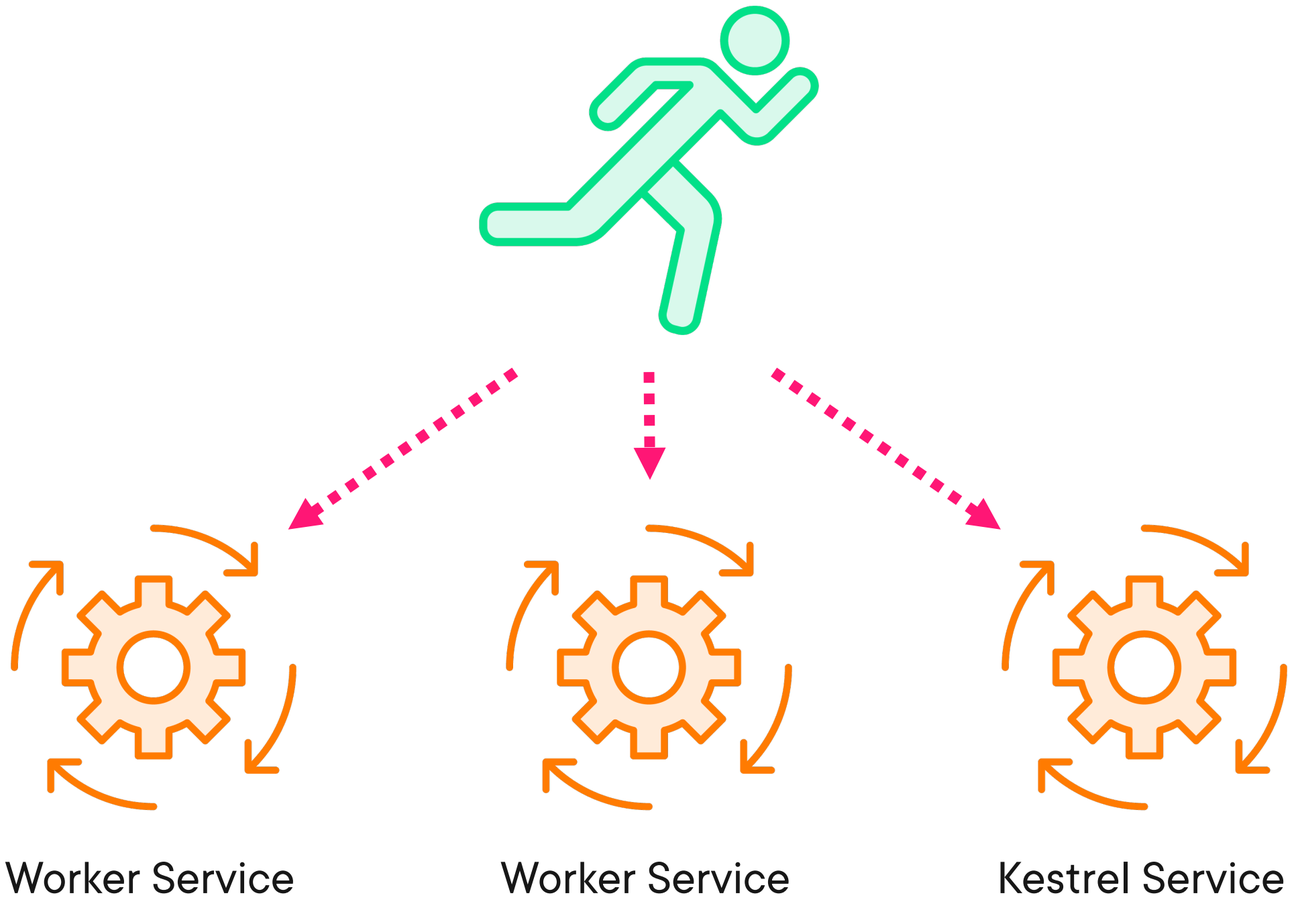
CTRL + C

Process termination

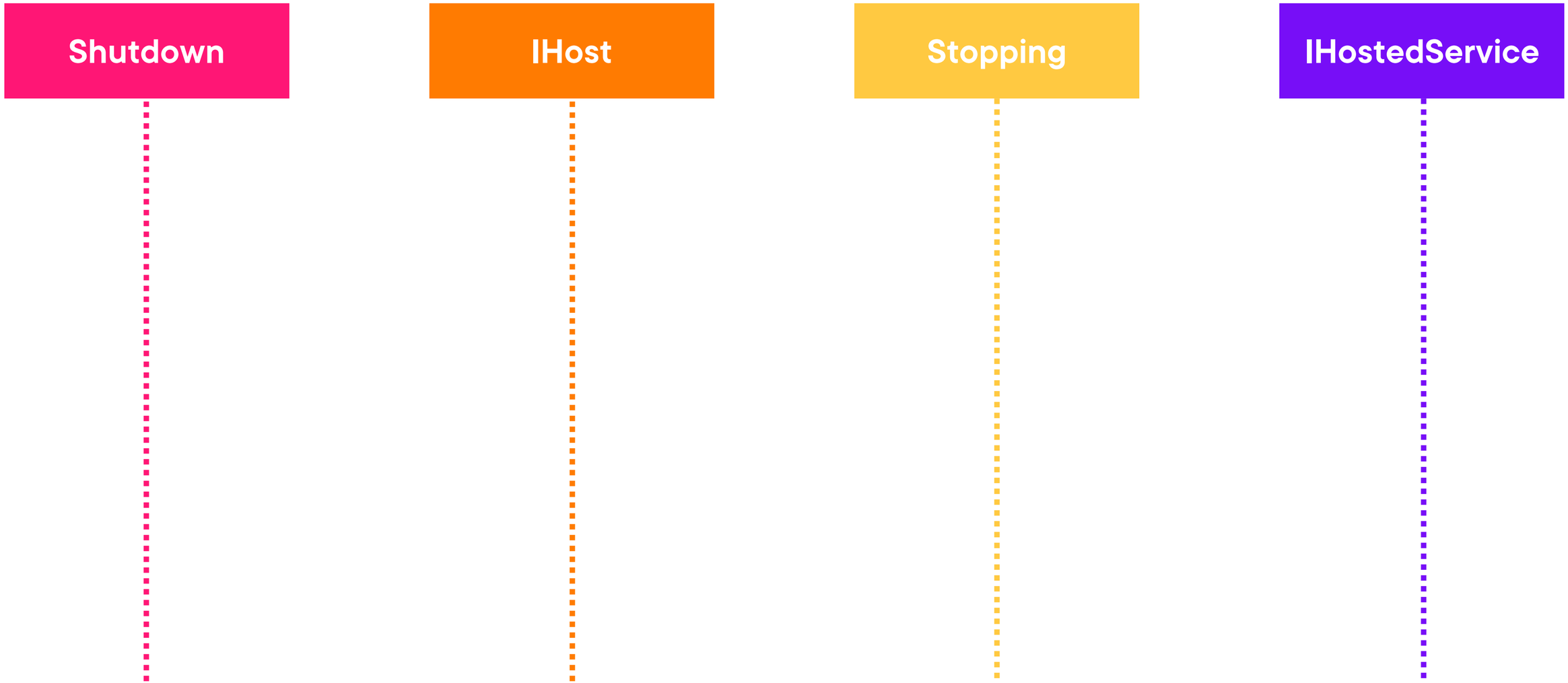
Programmatic shutdown

Running Host

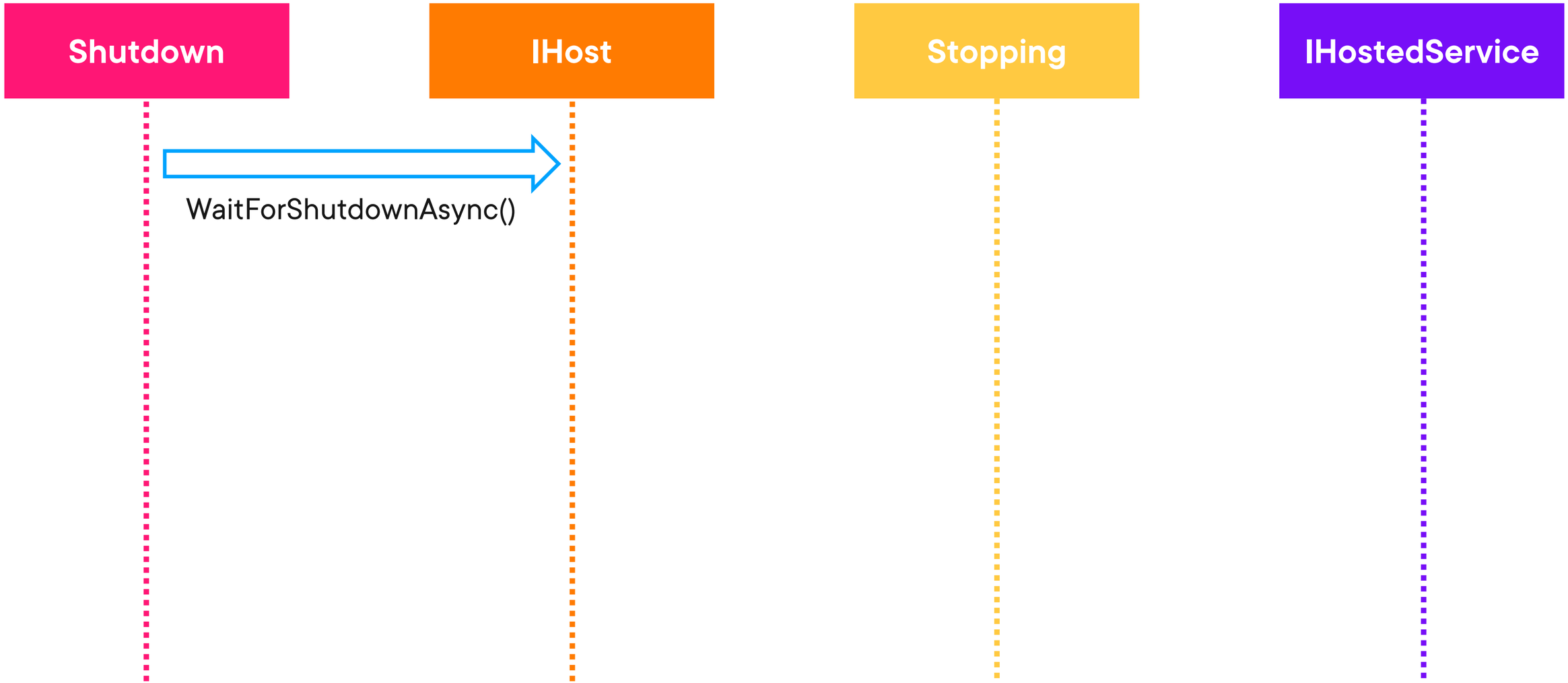
Running Host



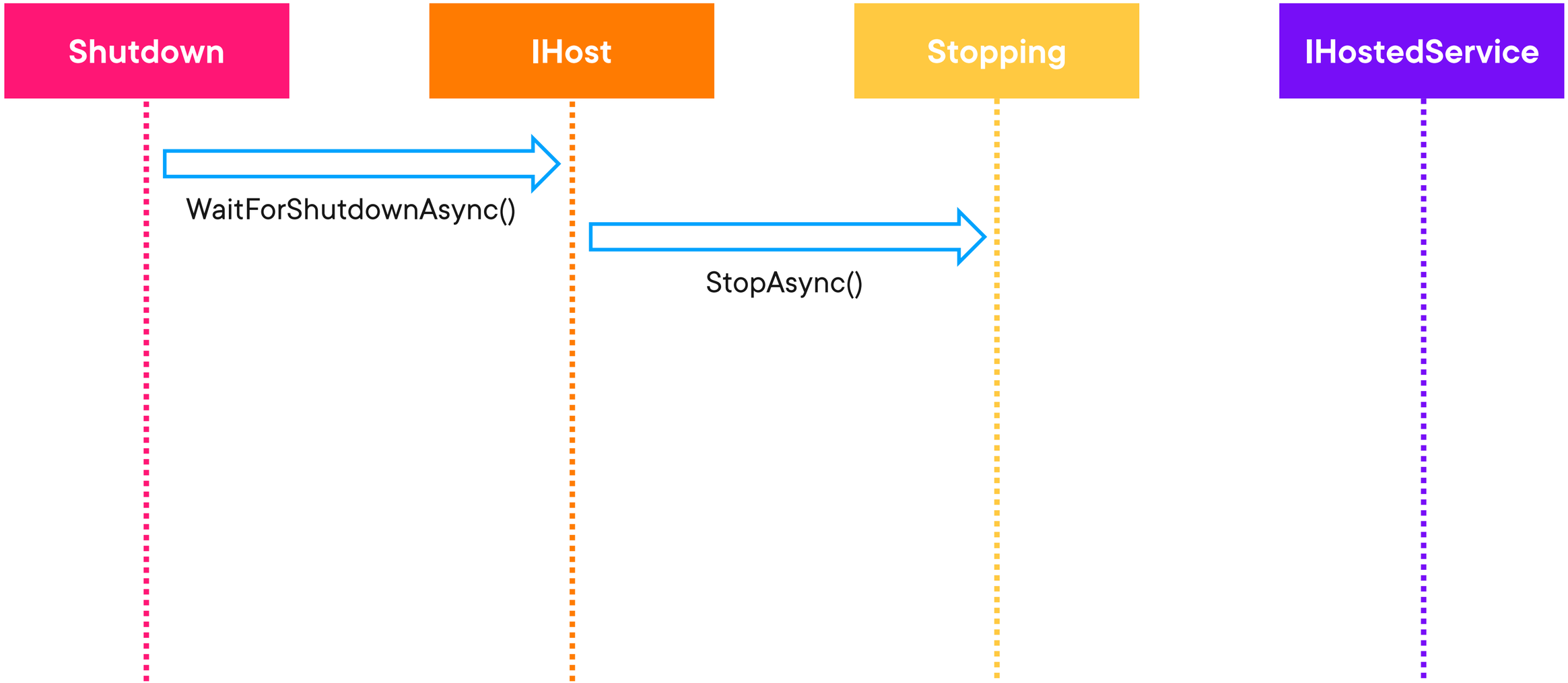
Host Shutdown



Host Shutdown



Host Shutdown



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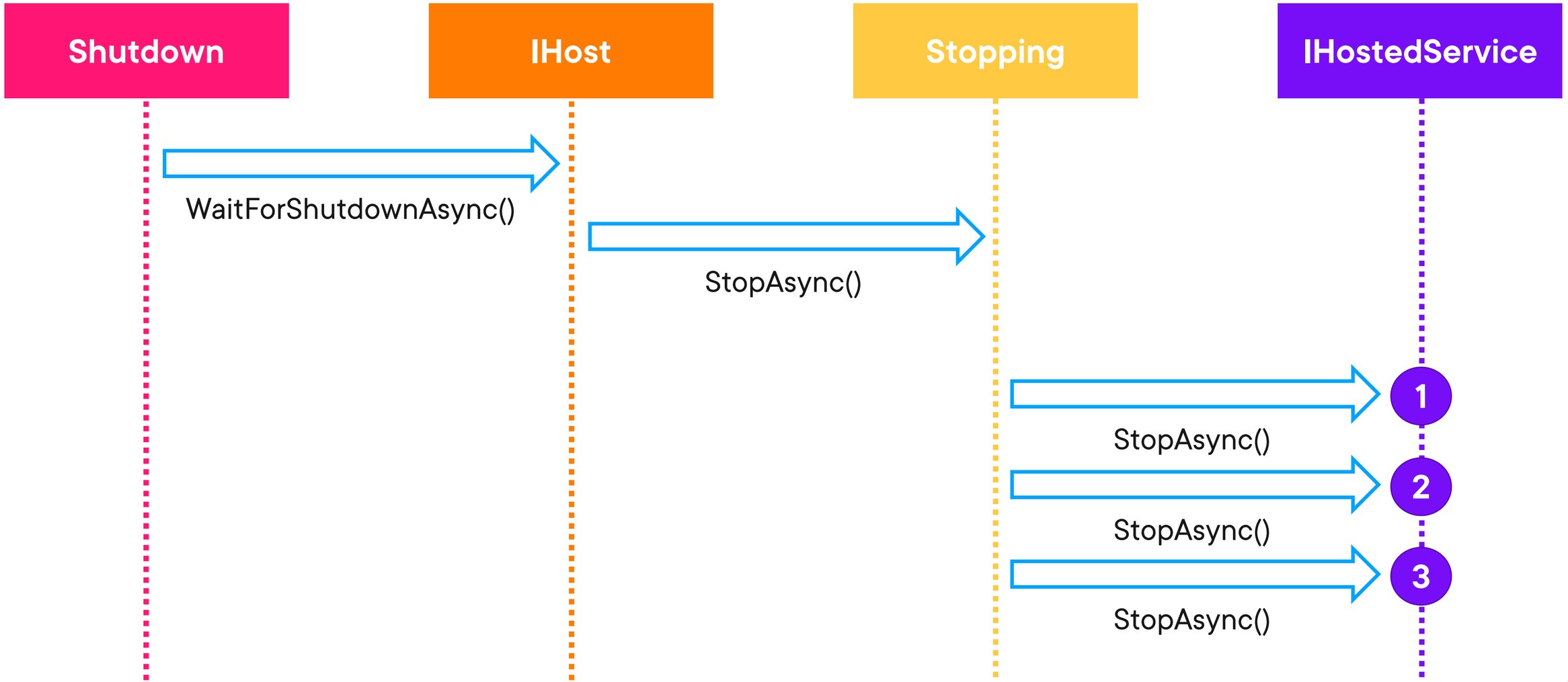


Worker Service Architecture

Objectives

Remove data processing from web application

Break off responsibilities to microservices

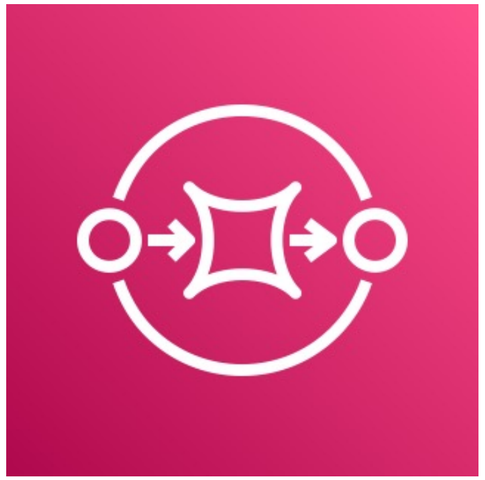
Design for cloud hosting in AWS

The techniques used in this course can be applied to any cloud provider.

Amazon Web Services (AWS)

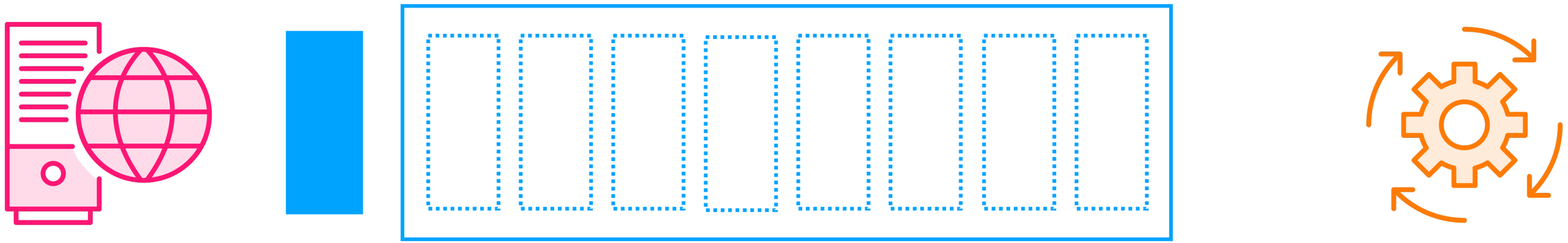
Simple Storage Service (S3)

Simple Notification Services (SNS)



Simple Queue Service (SQS)

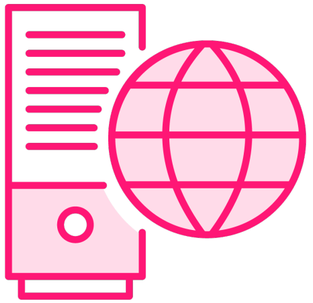
Decoupling Services with Queues



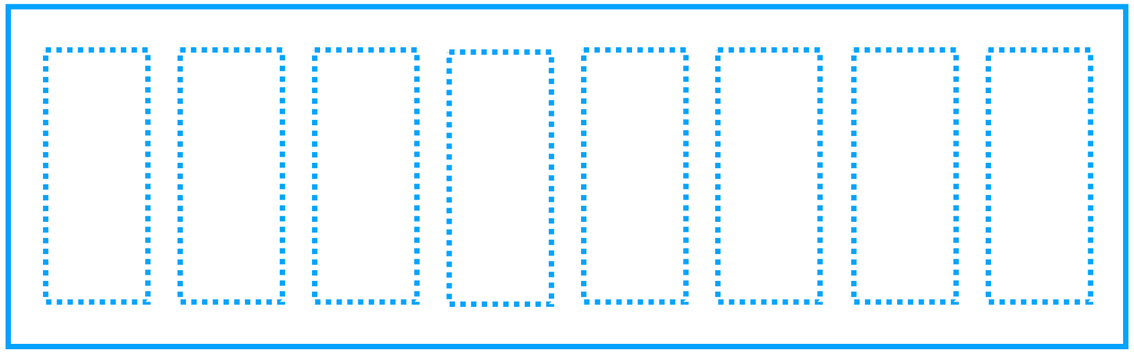
Web Application

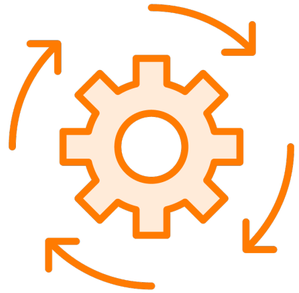
Worker Service

Decoupling Services with Queues



Web Application

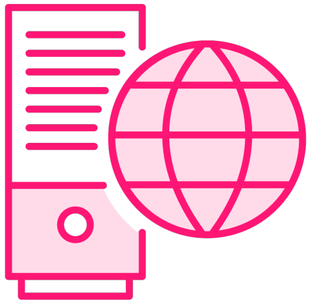




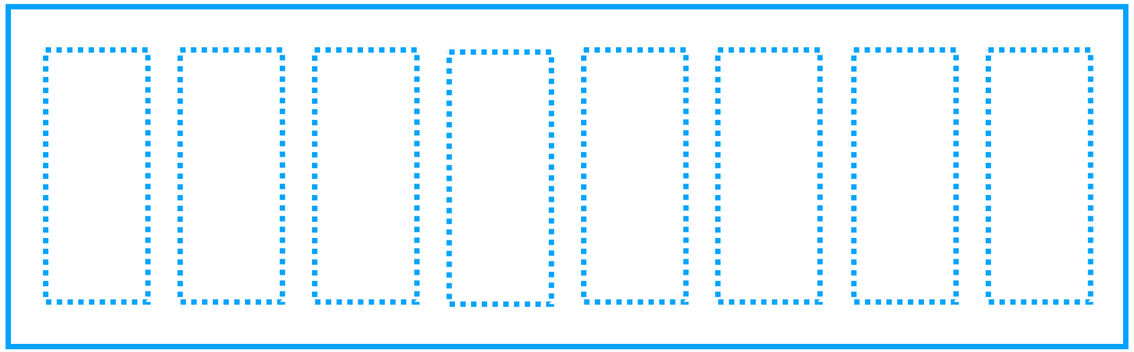
Worker Service

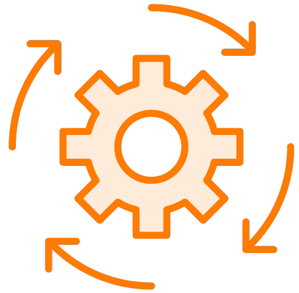
PRODUCER

Decoupling Services with Queues



Web Application



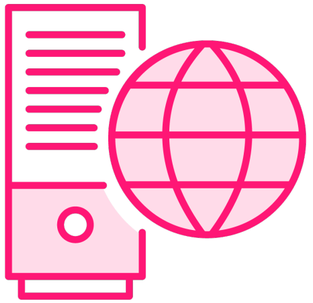


Worker Service

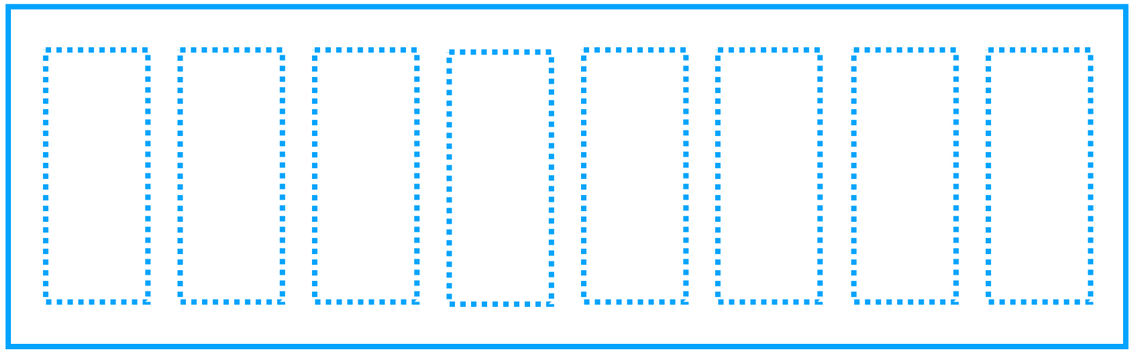
PRODUCER

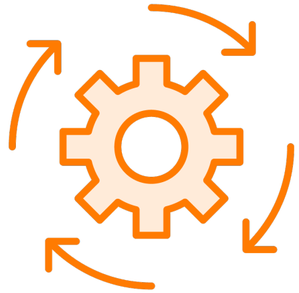
CONSUMER

Decoupling Services with Queues



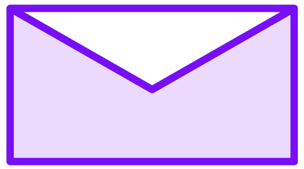
Web Application





Worker Service

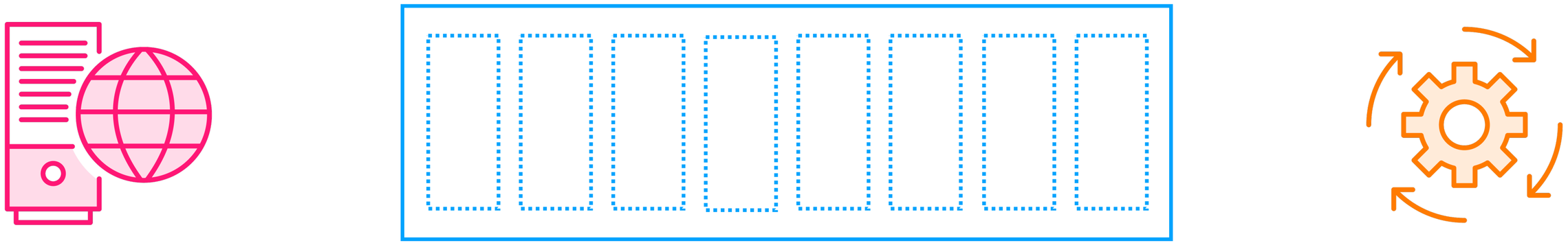
PRODUCER



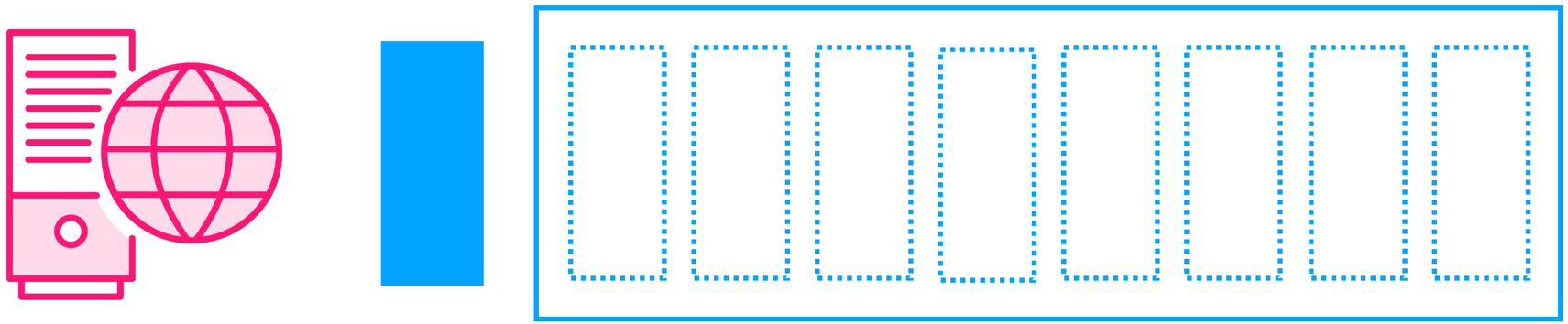
CONSUMER

```
{
    ...
}
```

Decoupling Services with Queues



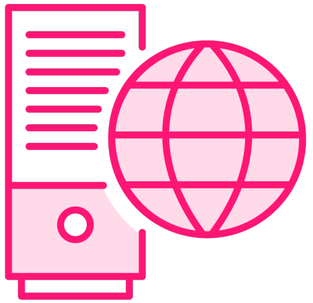
Decoupling Services with Queues



Web Application

Worker Service

Decoupling Services with Queues



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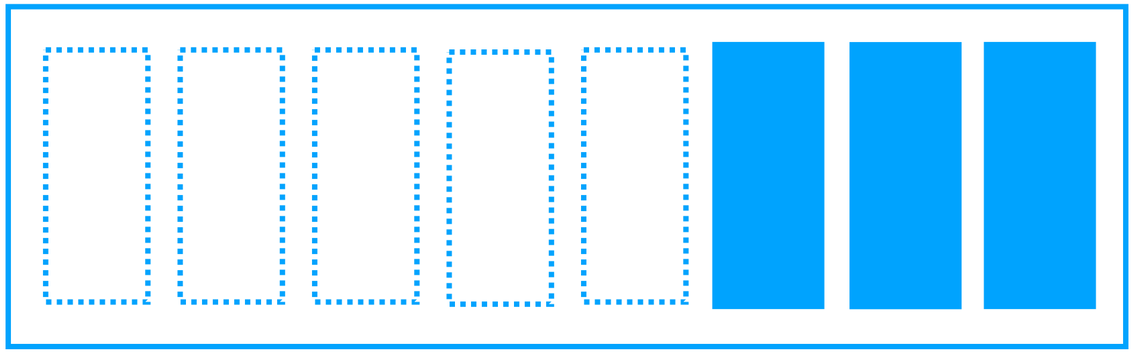
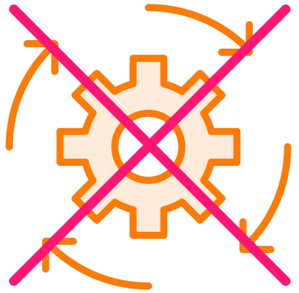
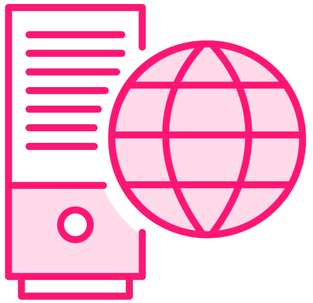




Worker Service

Decoupling Services with Queues



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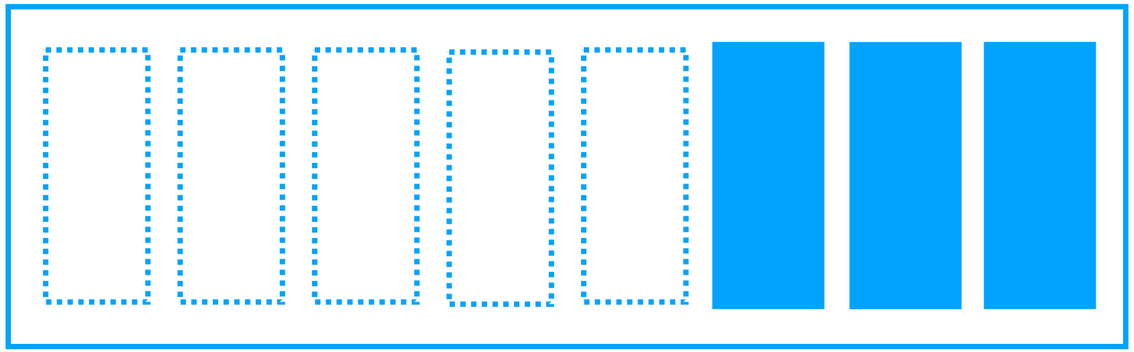
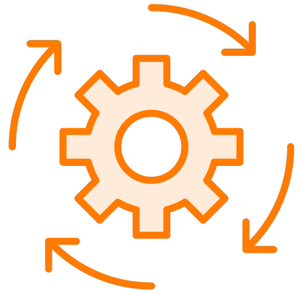
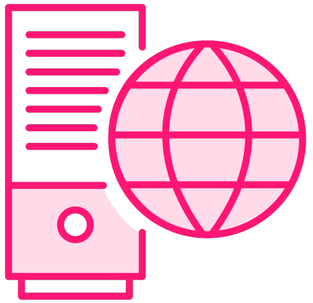


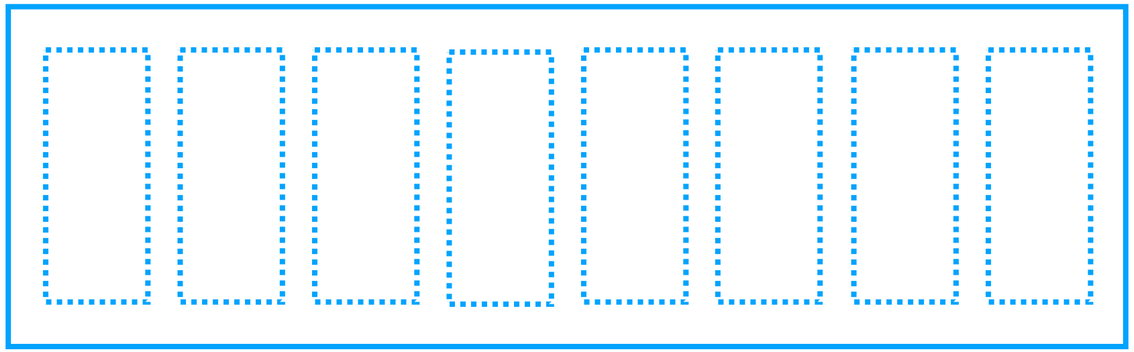


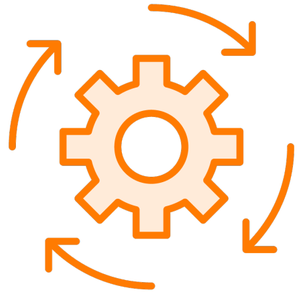
Worker Service

Decoupling Services with Queues



Web Application





Worker Service

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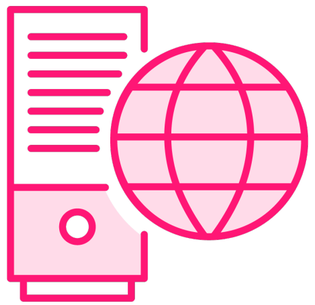
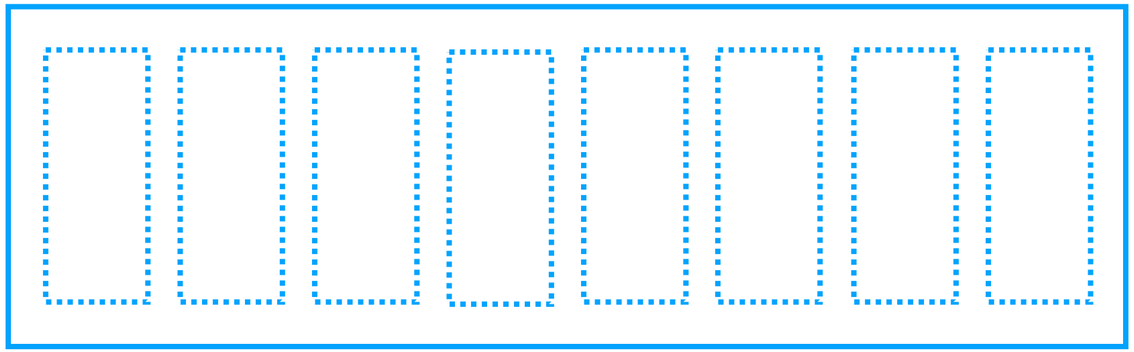
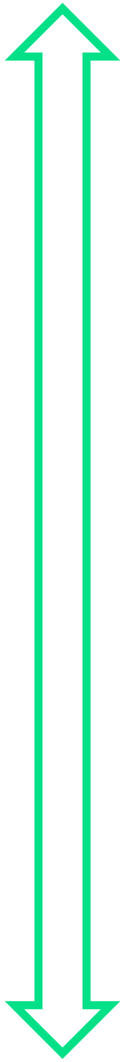
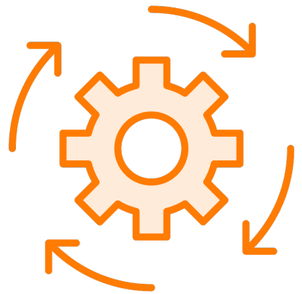
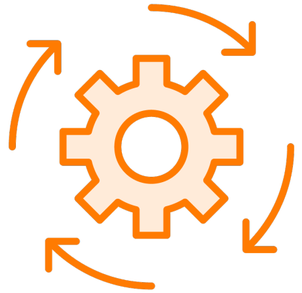


Web Application

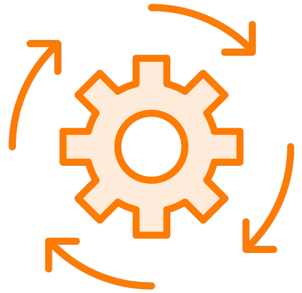




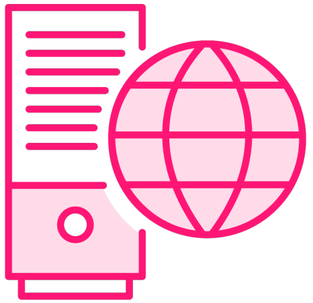




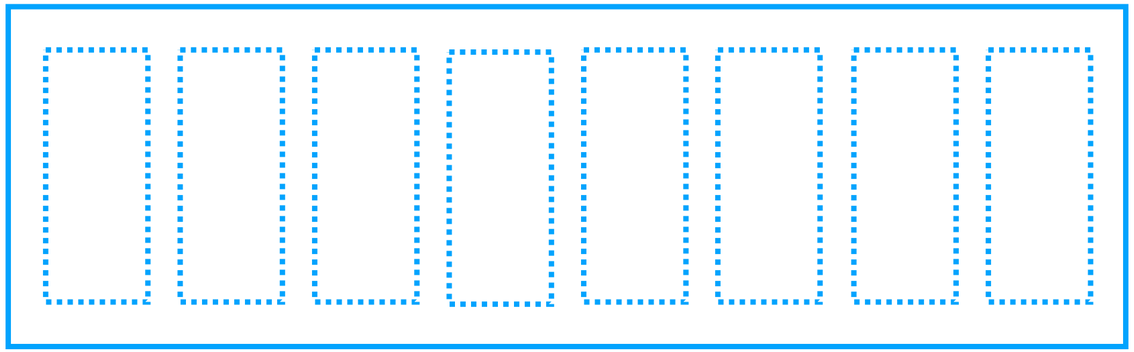
Worker Service

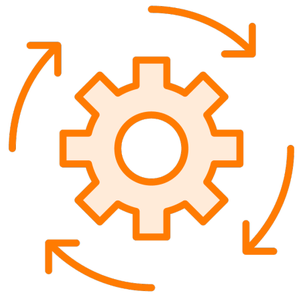


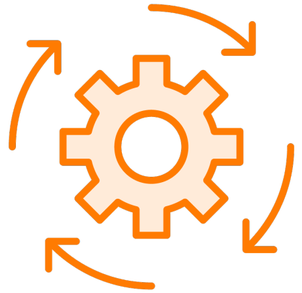
Decoupling Services with Queues



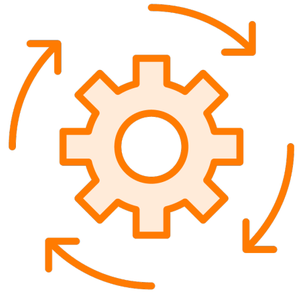
Web Application



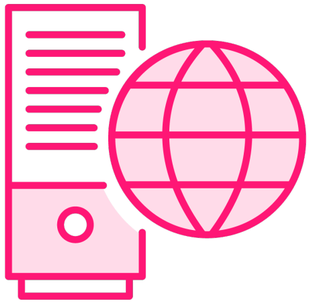




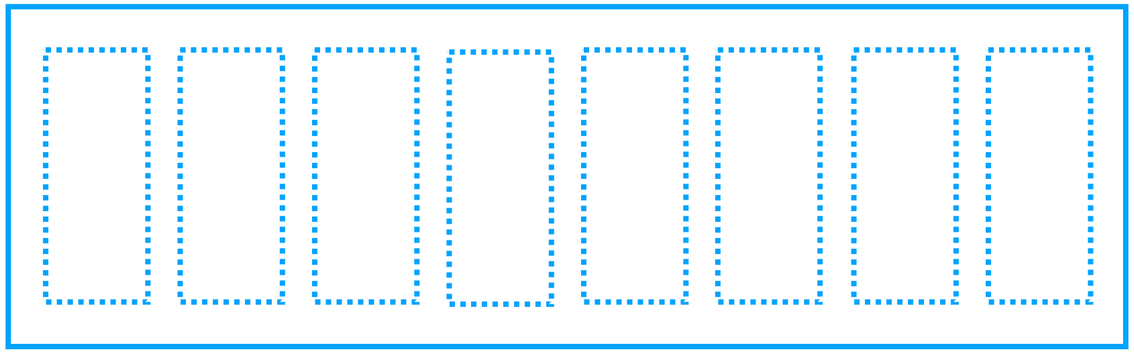
Worker Service



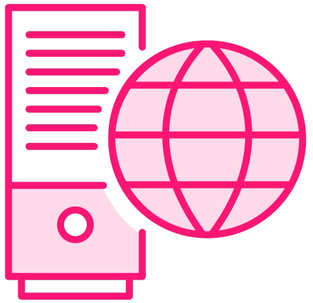
Decoupling Services with Queues



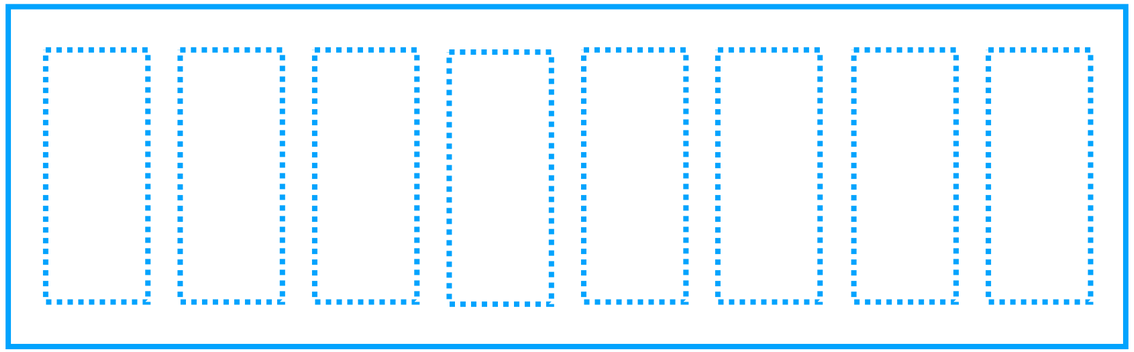
Web Application



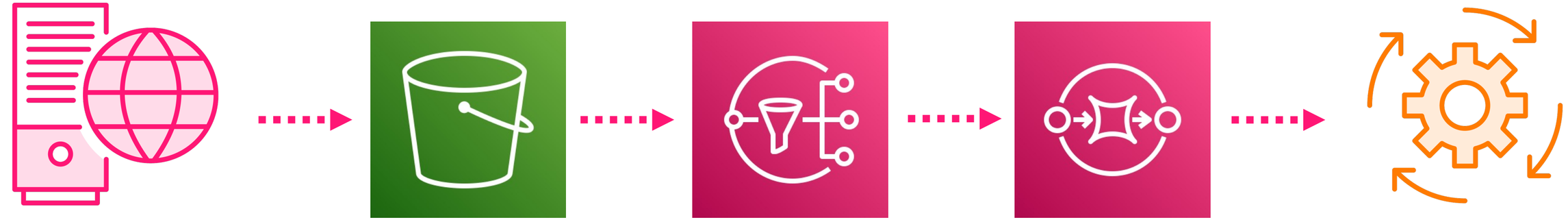
Decoupling Services with Queues



Web Application



AWS Architecture



Setup Amazon Web Services (AWS)

AWS Stack Creation

- S3 bucket
- SNS topic
- SQS queue
- IAM user and role

Setup LocalStack

Create a background service

- Read message from an SQS queue
- Write S3 filename to channel

Learn More

Dependency Injection in ASP.NET Core 6

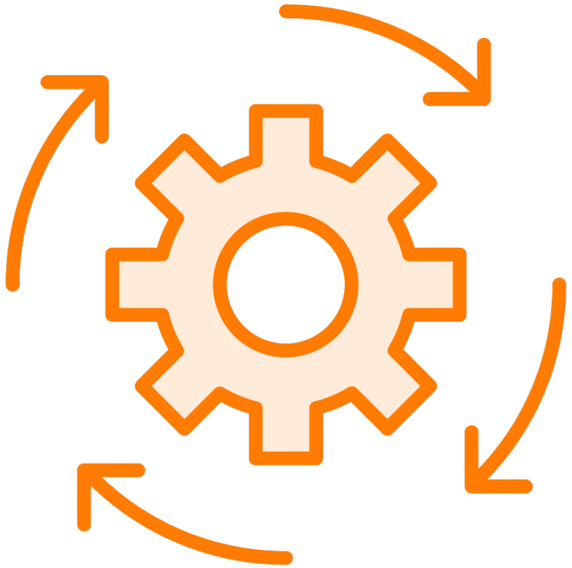
Steve Gordon

Create a second background service

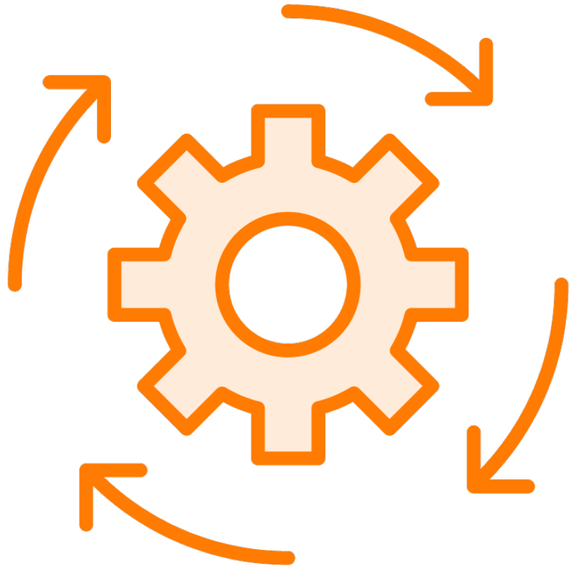
- Read SQS messages from the channel
- Load the results file from S3
- Process results
- Delete the SQS message

Concurrent Processing

QueueReadingService



ScoreProcessingService



Advanced Data and Stream Processing with Microsoft TPL Dataflow

Szymon Warda

Refactor the web application

- Remove responsibility for result processing

Summary

Worker service template

Built a worker service

- Replaced web application processing
- Created a .NET microservice

Host provides features such as

- Dependency injection
- Logging
- Configuration

Up Next:

Understanding Advanced Hosted Service Concepts