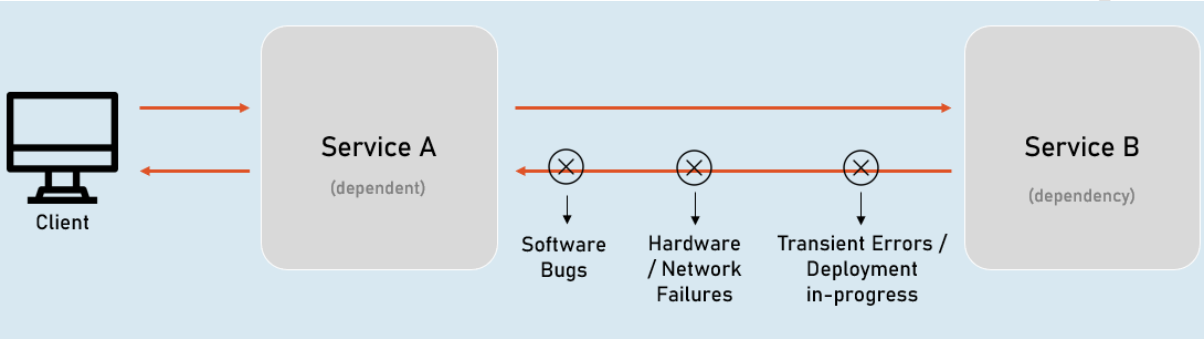
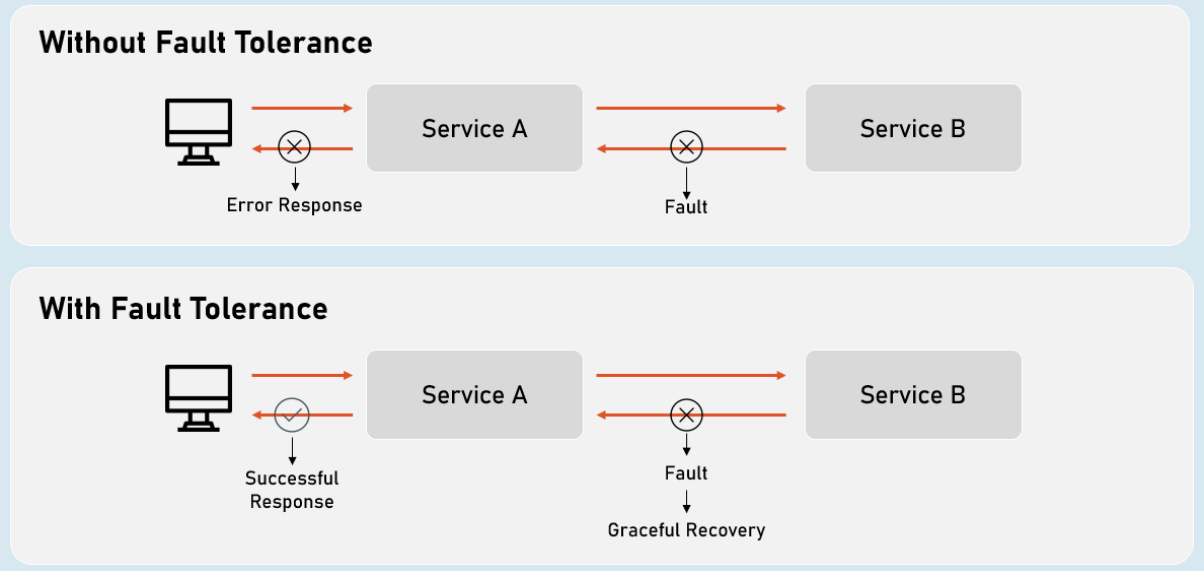
.NET Core Microservices – True Ultimate Guide

Section 8 – Fault Tolerance – Cheat Sheet

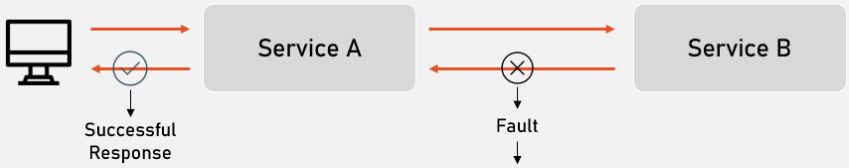
Fault Tolerance

Fault tolerance refers to a system's capability to continue operating properly and deliver expected functionality despite encountering faults (or exceptions).





Fault Tolerance



1. Early Detection: Identify exceptions / failures as early as they occur.
2. Prevention of Cascading Failures: Prevent faults of one component propagate to other component or outer layer.
3. Graceful Degradation: Generate fallback / dummy data or interact with alternative channels to complete the operation successfully.

Polly

Polly is a .NET library used for implementing fault-handling policies in applications, especially in microservices architectures.

It provides features like retries, timeouts, circuit breakers, and fallback mechanisms to improve fault tolerance of distributed systems.

NuGet packages of Polly

Polly

Provides core functionality for resilience policies such as retries, timeouts, circuit breakers, and fallbacks.

Polly.Extensions.Http

Extends Polly policies for use with HTTP requests.

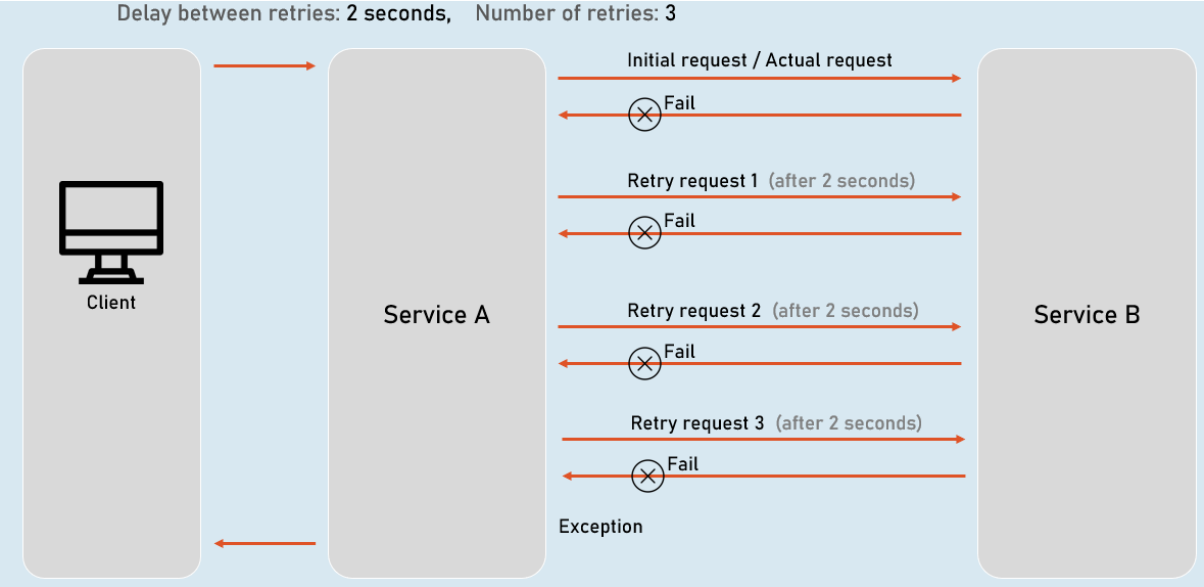
Microsoft.Extensions.Http.Polly

Provides extension methods to apply Polly policies with HttpClientFactory in a centralized manner.

Polly.Retry

"Retry" policy in Polly

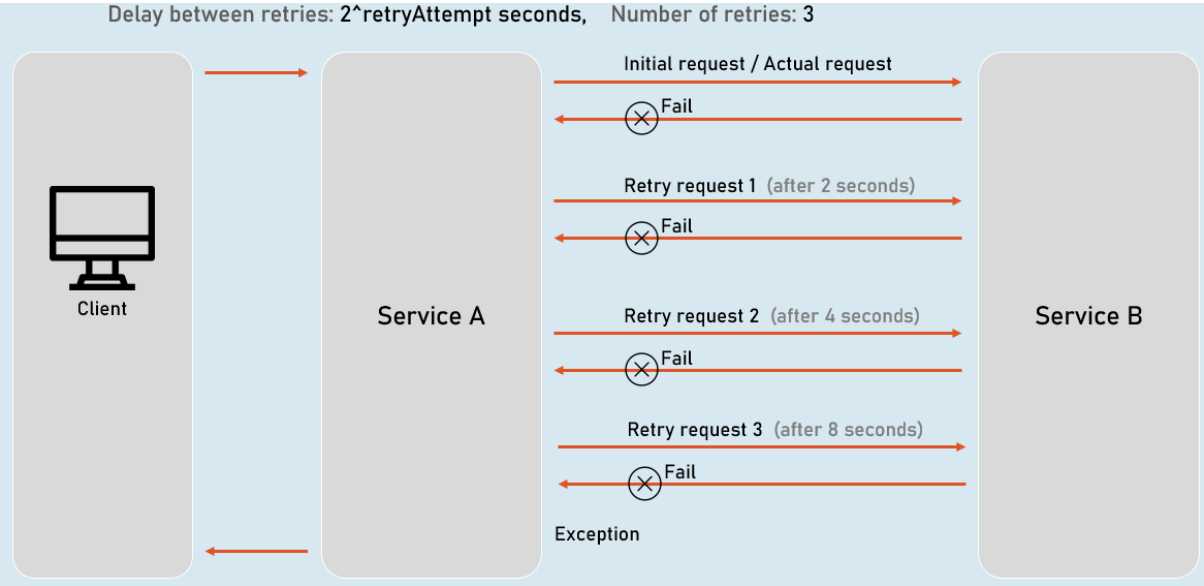
The "retry" policy in Polly works by automatically reattempting a failed HTTP request for a specified number of times, with a specific delay between each attempt.



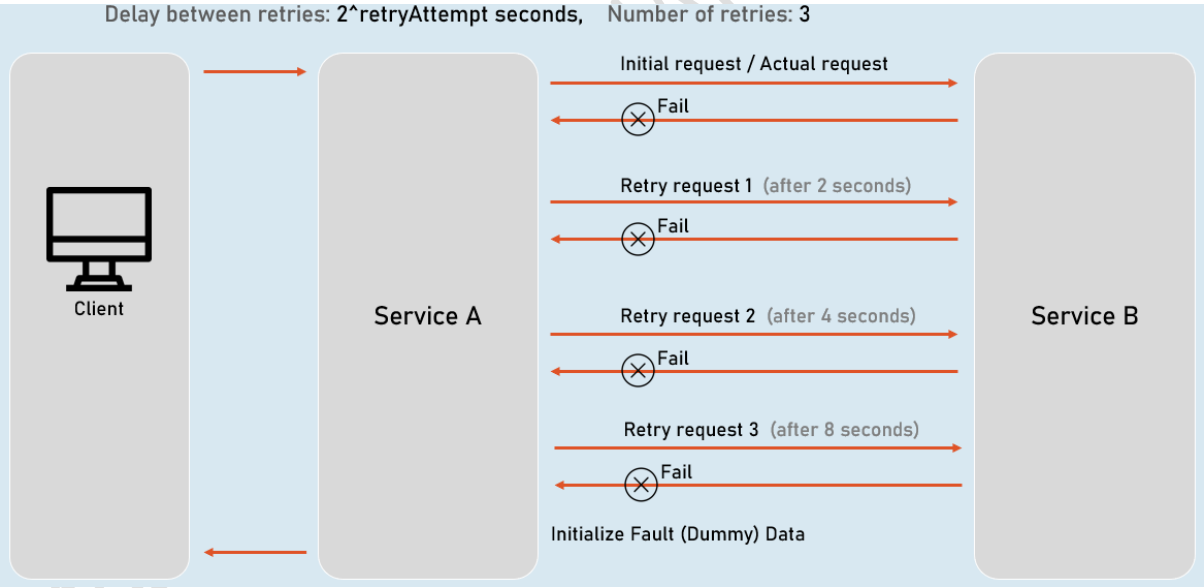
Exponential Backoff

Exponential Backoff with Retry

Exponential backoff is a retry strategy where the delay between retries increases exponentially with each attempt.



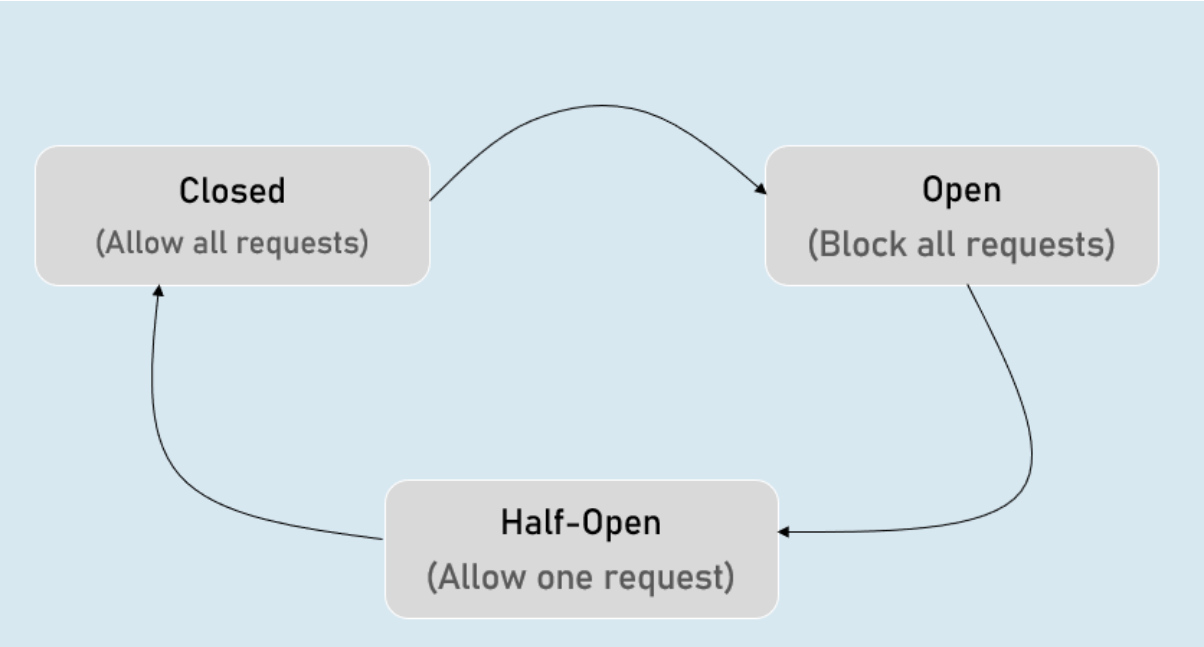
Fault Data

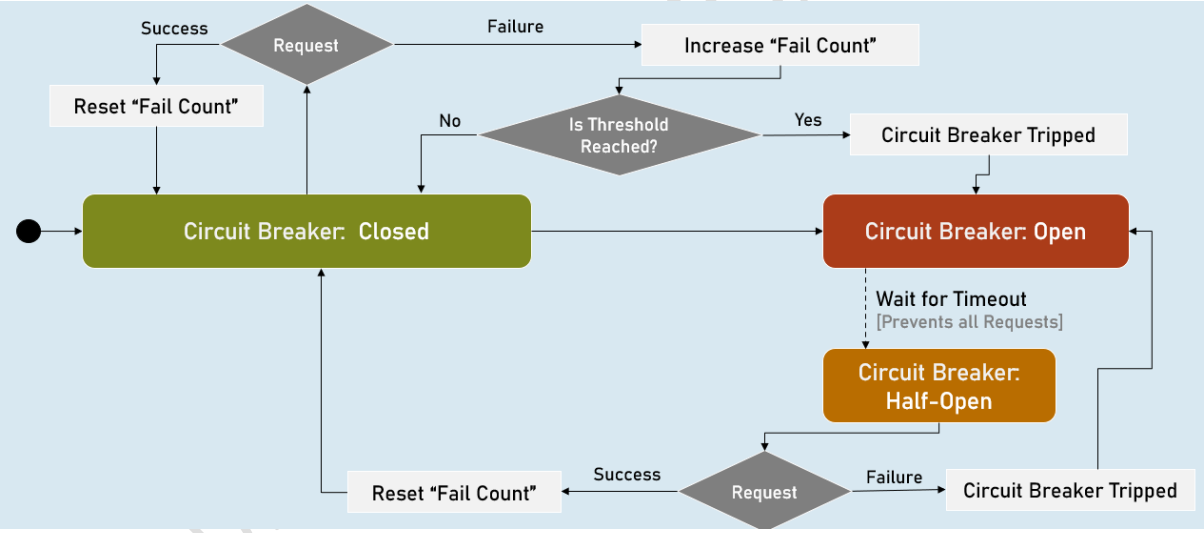


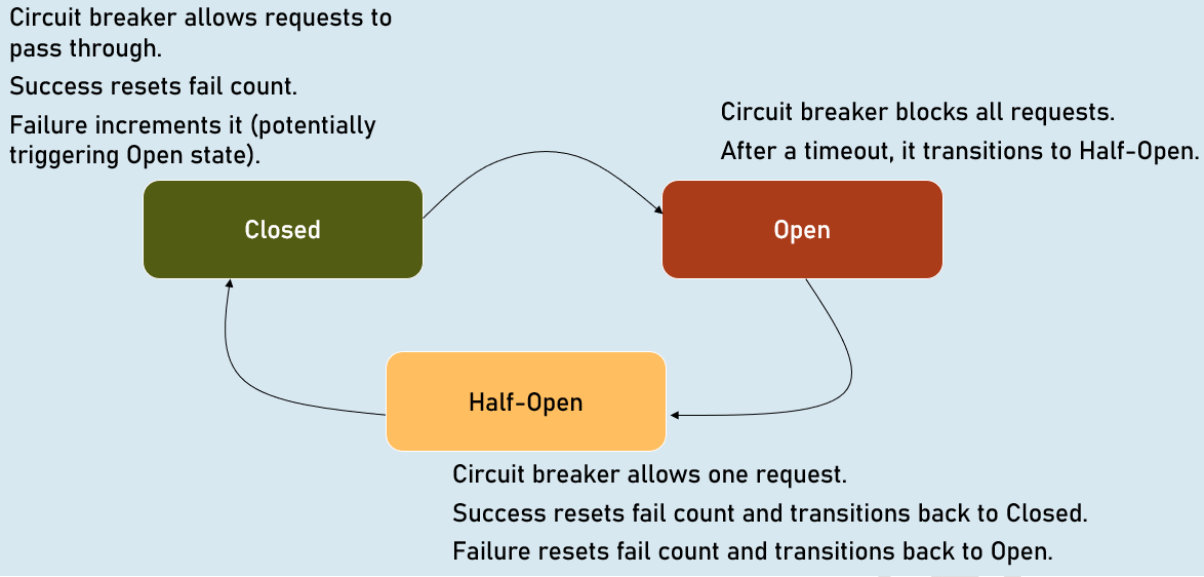
Circuit Breakers

When the number of errors exceeds a predefined threshold within a certain timeframe, the circuit breaker 'trips' and enters an 'open' state which prevents any further requests to the underlying service, until the underlying service recovers.

How Circuit Breaker works?

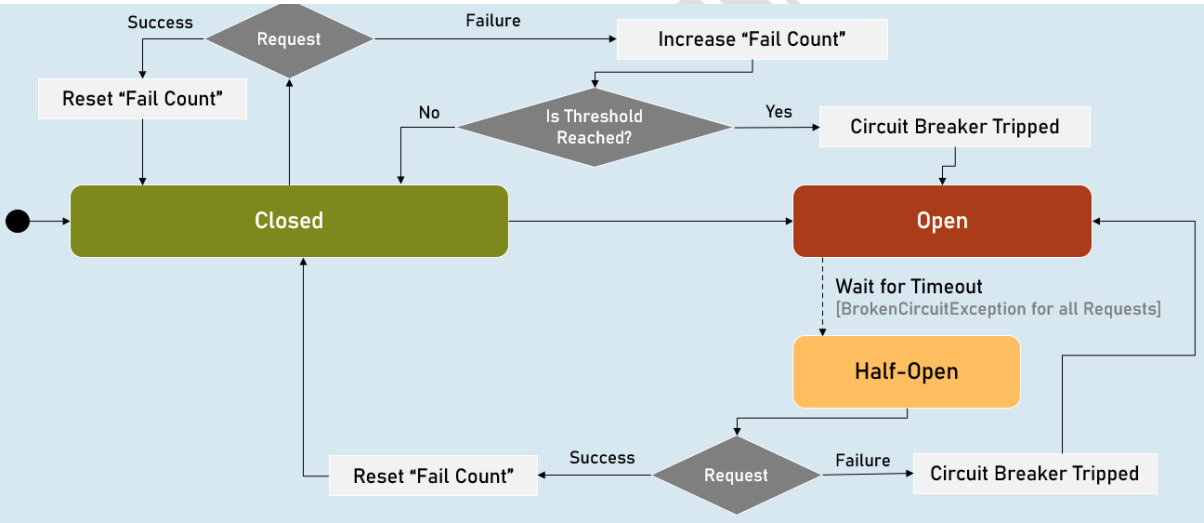






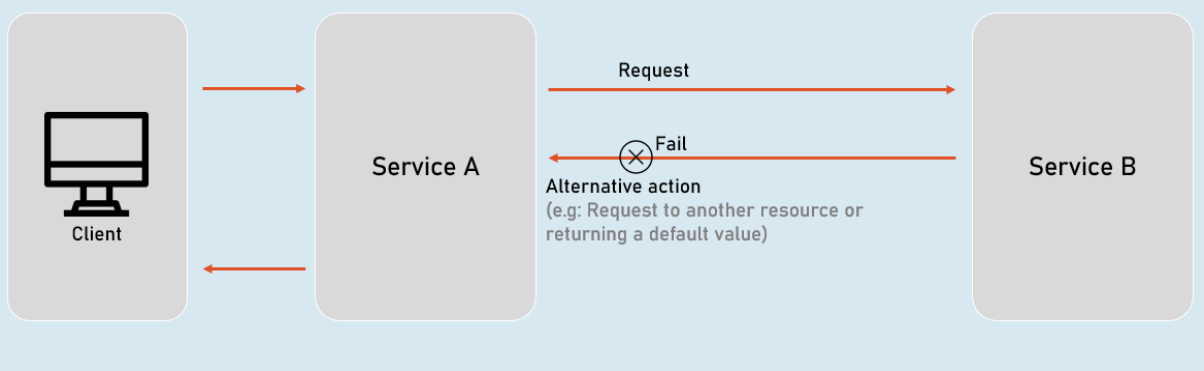
BrokenCircuitException

How Circuit Breaker works?



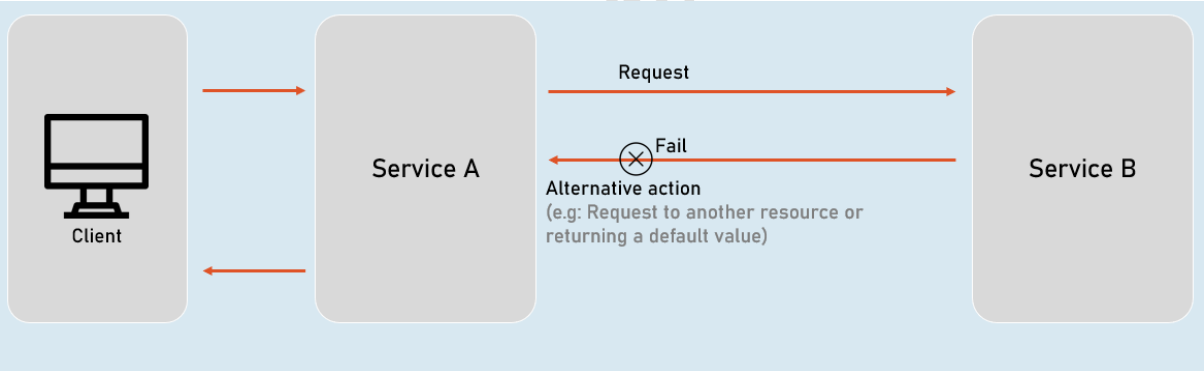
Fallback

The fallback policy in Polly specifies an alternative action, such as returning a default value or performing a secondary operation, when the primary operation fails.



Timeout

The timeout policy in Polly sets a time limit for an operation to complete. If the operation exceeds the time limit, the policy triggers a timeout, and the operation is aborted.



Bulkhead Isolation