Kresil
Kotlin Resilience

Kotlin Multiplatform library for fault-tolerance

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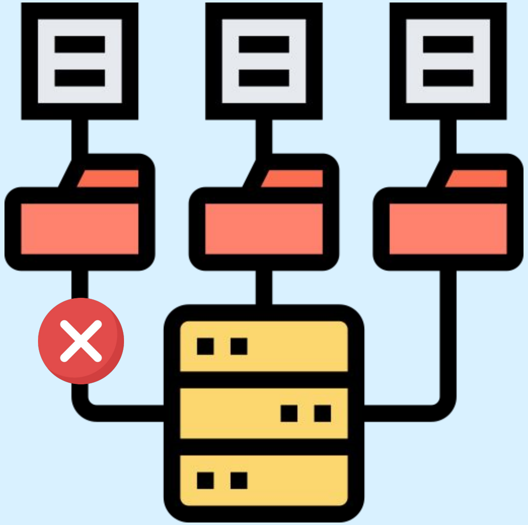
Resilience in Distributed Systems



If failure is inevitable, what can be done?

Mechanisms

Retry - Repeats failed executions

Rate Limiter - Limits executions/period

Circuit Breaker - Temporarily blocks possible failures

Time Limiter - Limits duration of execution

Cache - Memorizes a successful result

Fallback - Defines a fallback action on failure

And many more...

Context

What is out there?

Resilience4j

POLLY

Netflix's Hystrix

Kotlin Multiplatform

Kotlin/JS

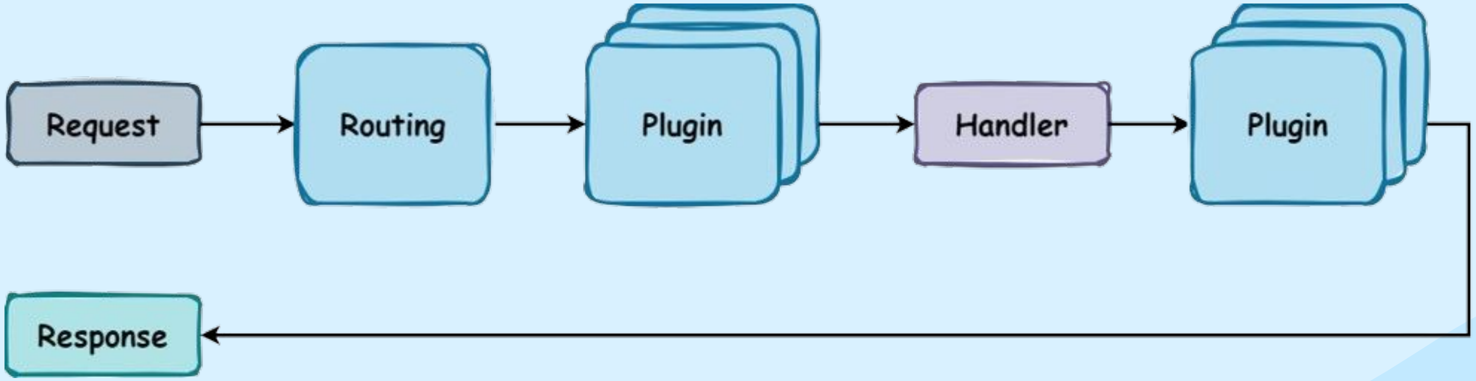
Kotlin/Native

Kotlin/Android

Kotlin/JVM

Ktor Framework

- Built with Kotlin Multiplatform;
- Enables asynchronous server and client development;
- Based on the coroutines system;
- Modular



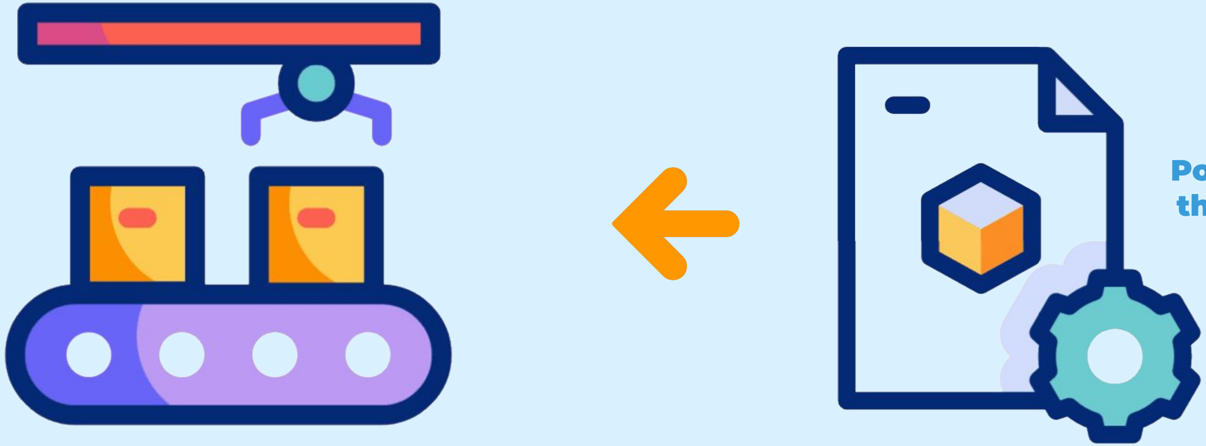
Design and Implementation Strategy

What was done?

- Studied the Retry mechanism and core functionality;
- Developed tests to understand the underlying state machine and how context decoration works

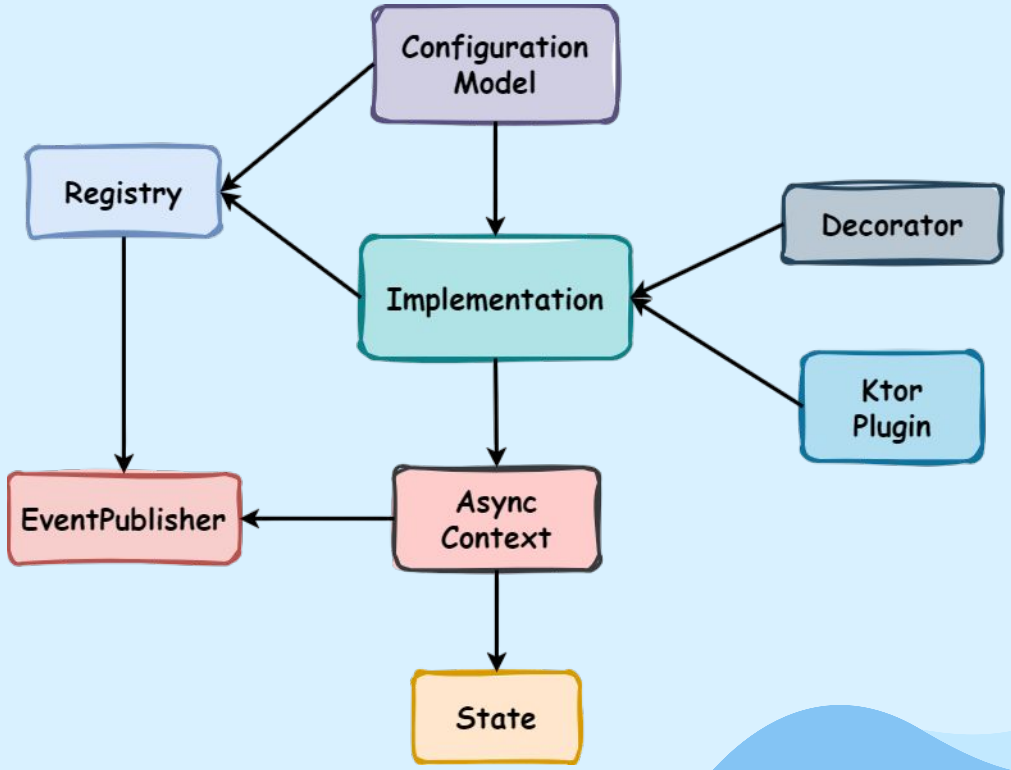
- Studied Ktor client and server pipeline;
- Learned the custom plugin API for both server and client side;
- Delved into the HttpRequestRetry plugin and how it adds its functionality in the pipeline

Mechanism Configuration



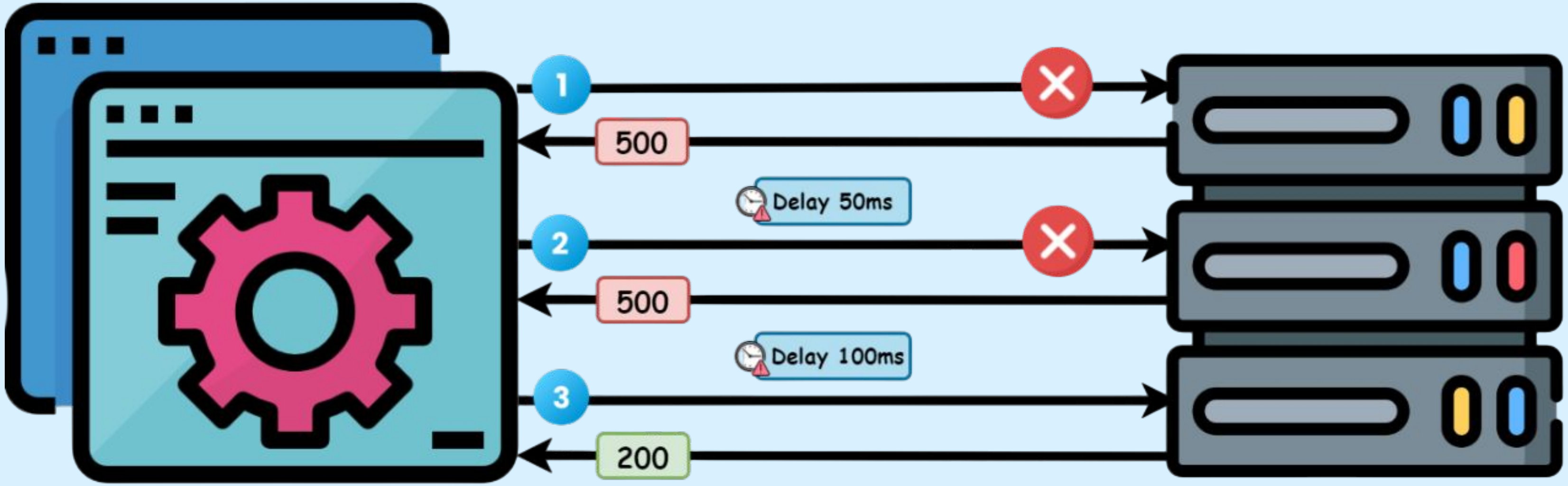
Policies - Define the mechanism behaviour

Mechanism Model

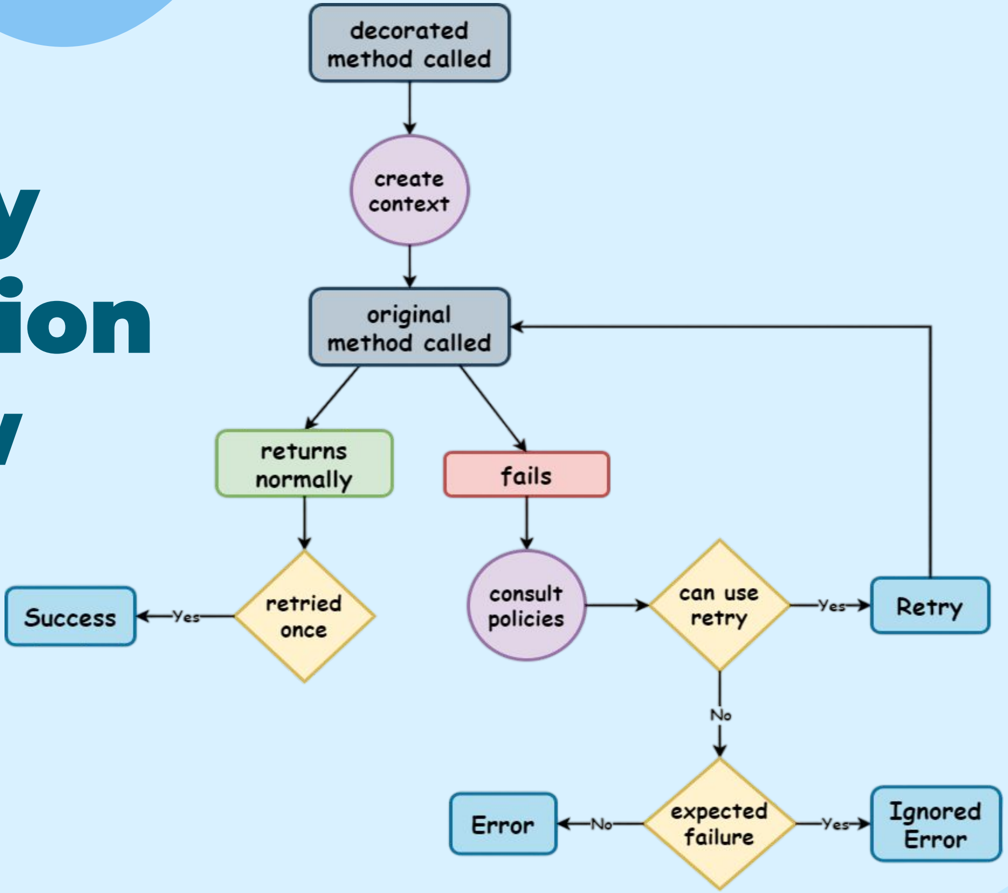


Retry Mechanism

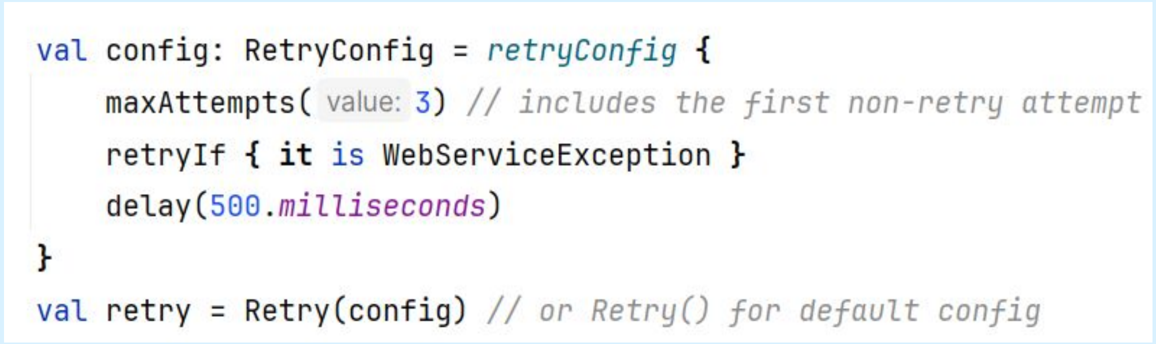
Retry



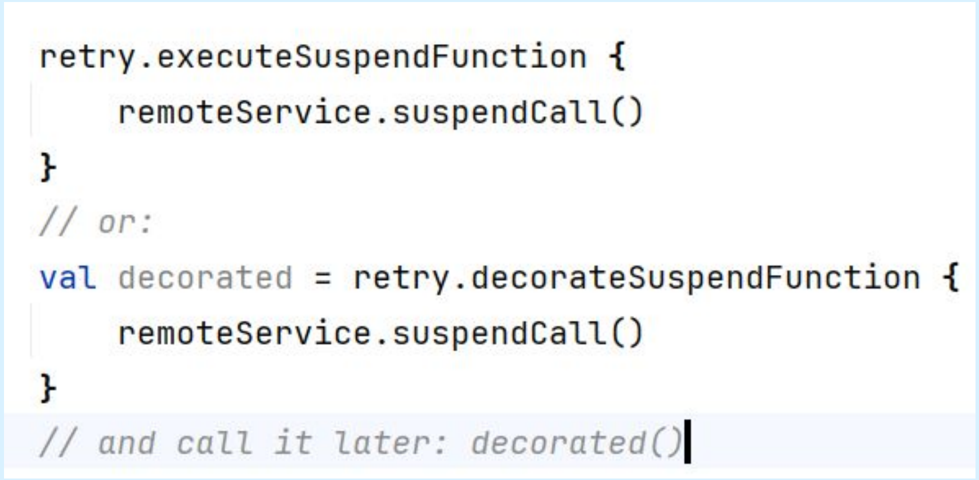
Retry Execution Flow



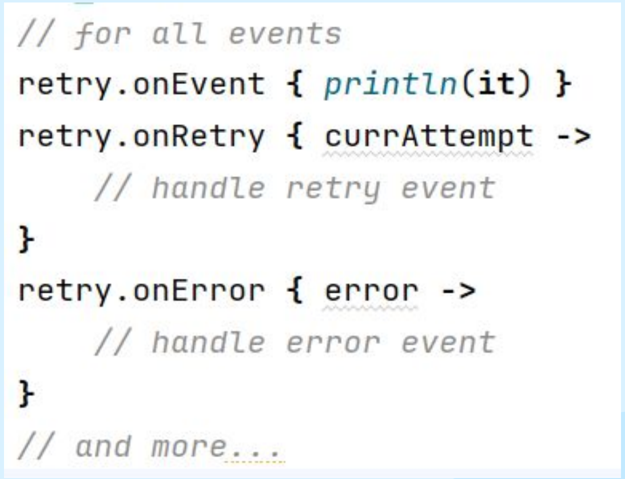
Code



```kotlin
val config: RetryConfig = retryConfig {
    maxAttempts( value: 3) // includes the first non-retry attempt
    retryIf { it is WebServiceException }
    delay(500.milliseconds)
}
val retry = Retry(config) // or Retry() for default config
```

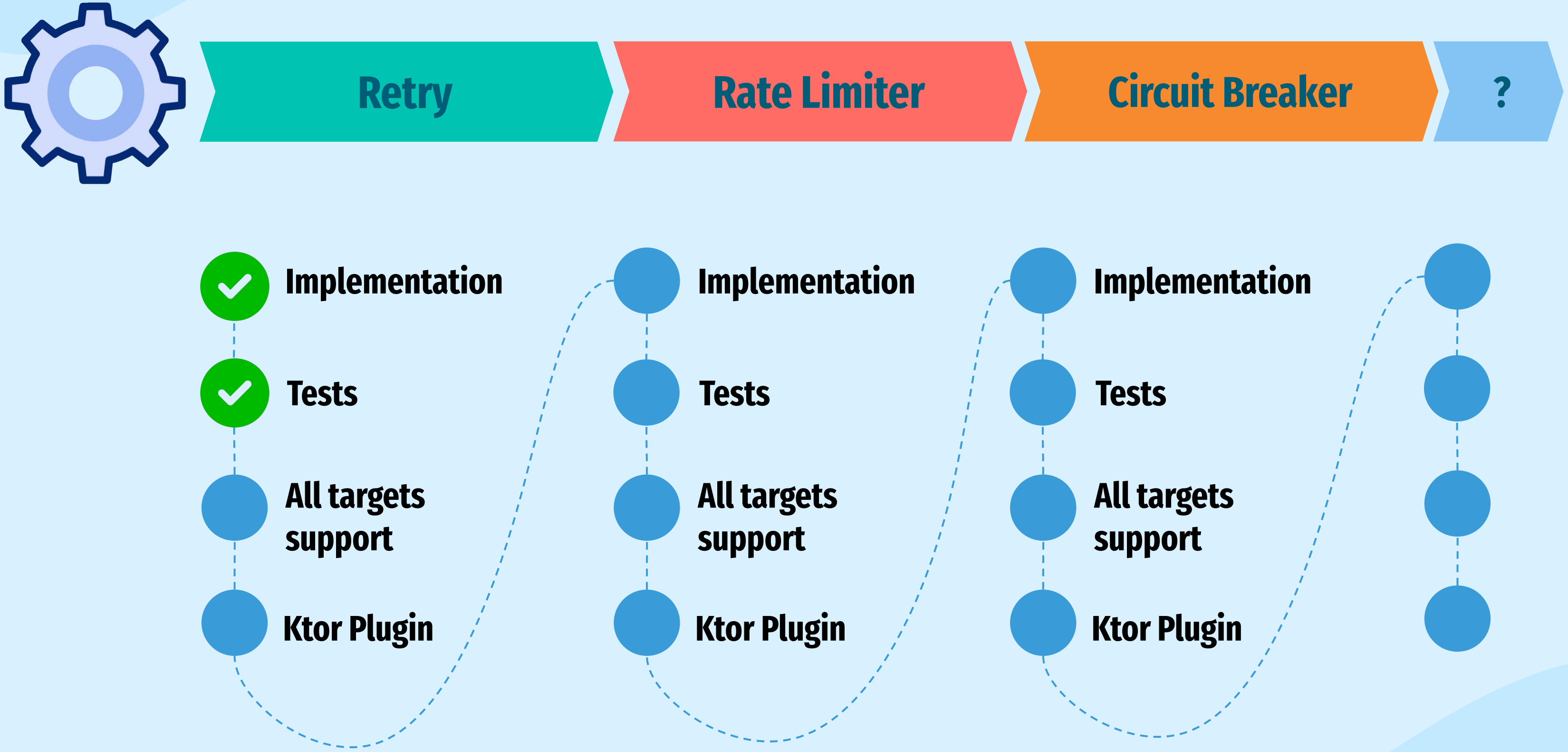


```kotlin
retry.executeSuspendFunction {
    remoteService.suspendCall()
}
// or:
val decorated = retry.decorateSuspendFunction {
    remoteService.suspendCall()
}
// and call it later: decorated()
```



```kotlin
// for all events
retry.onEvent { println(it) }
retry.onRetry { currAttempt ->
    // handle retry event
}
retry.onError { error ->
    // handle error event
}
// and more...
```

Roadmap


Retry
Rate Limiter
Circuit Breaker
?
✓ Implementation
✓ Tests
All targets support
Ktor Plugin
Implementation
Tests
All targets support
Ktor Plugin
Implementation
Tests
All targets support
Ktor Plugin

Questions?