OpenRewrite in a Nutshell

Scaling Upgrades with Practical Insights

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Frameworks we've used

Java™ Enterprise Edition

spring® 3

QUARKUS 2

JUnit

LOG4J 1

Upgraded to...

JAKARTA® EE

spring® 6

QUARKUS 3

JUnit 5

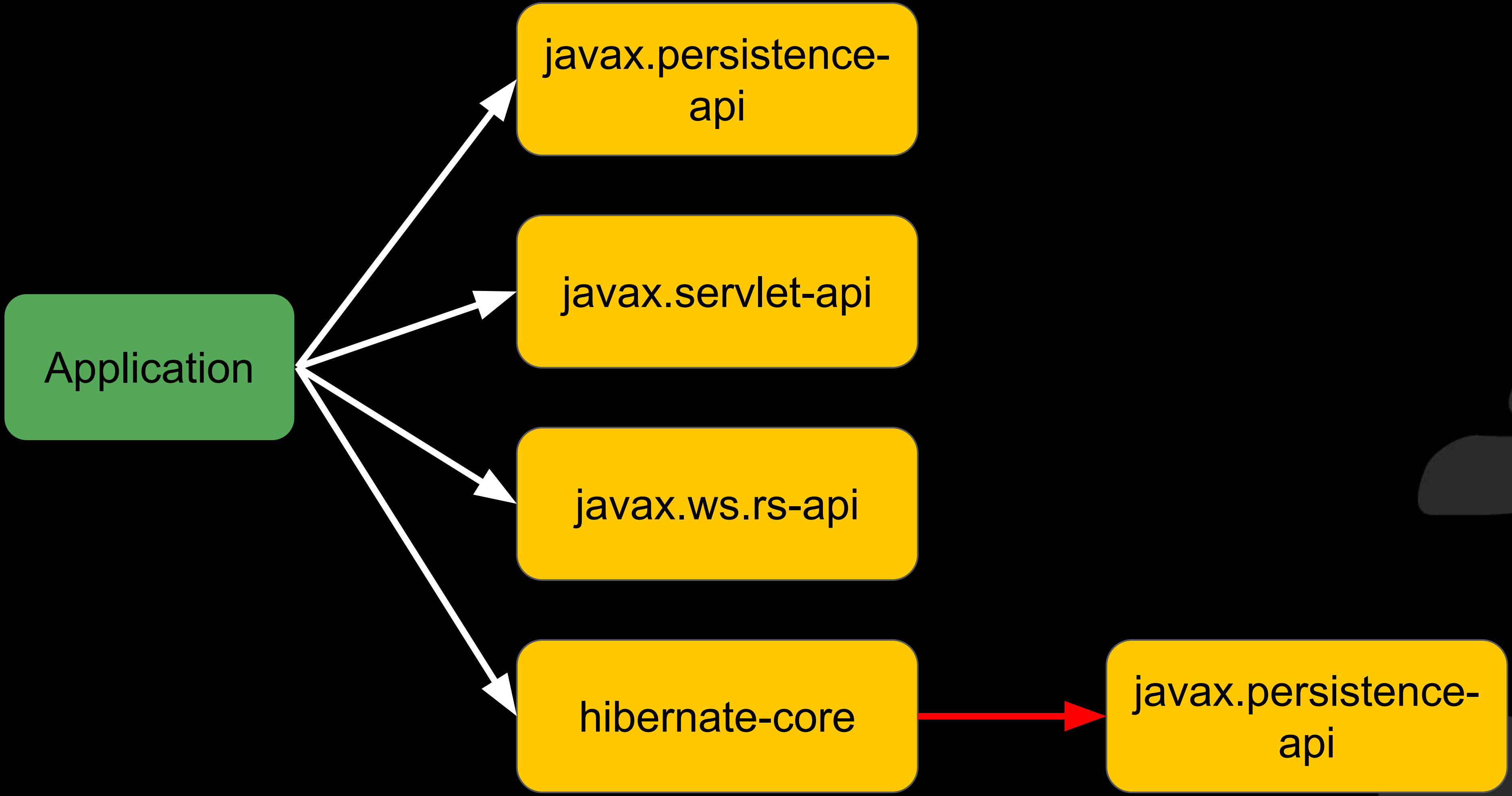
LOG4J 2

A large upgrade: Jakarta EE 9

// **javax**.inject.Inject -> **jakarta**.inject.Inject

// **javax**.naming.InitialContext -> **javax**.naming.InitialContext

A large upgrade: Jakarta EE 9



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Upgrading manually - A tedious task

// Time consuming

// Error prone

// Not fun

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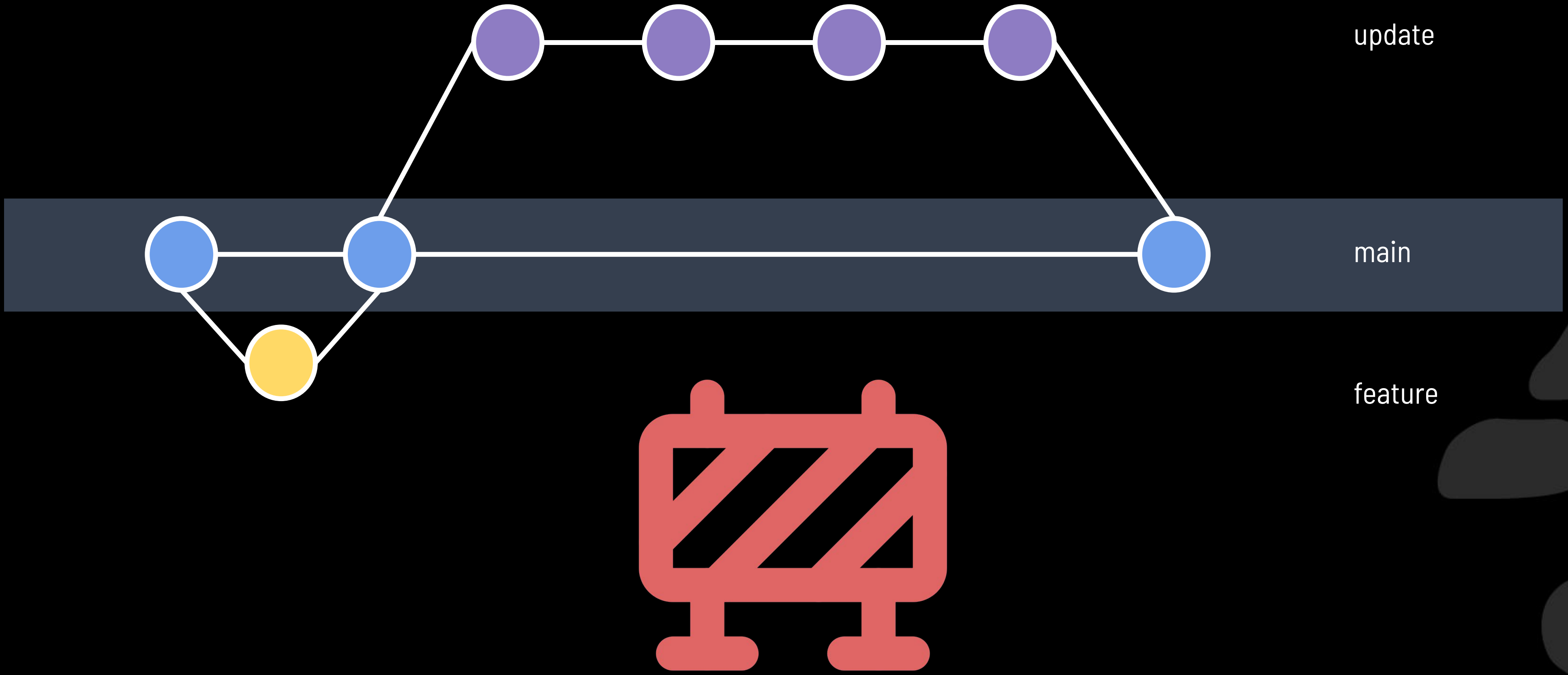
Upgrading manually - Stop the world



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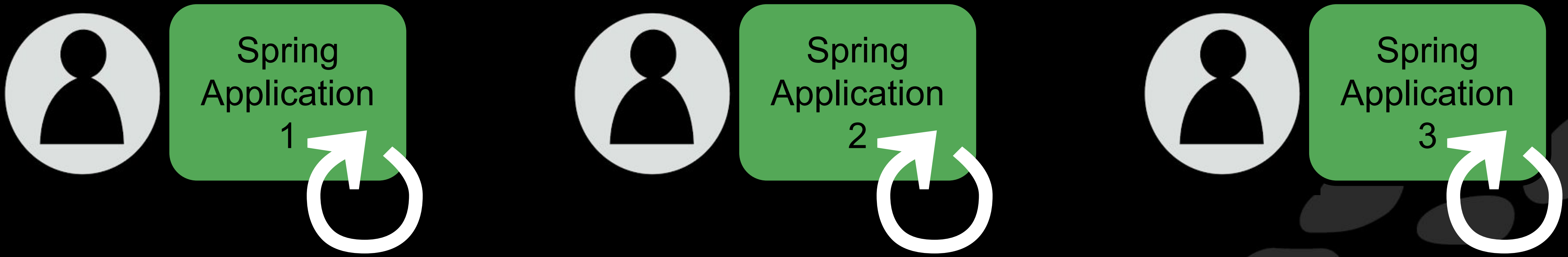
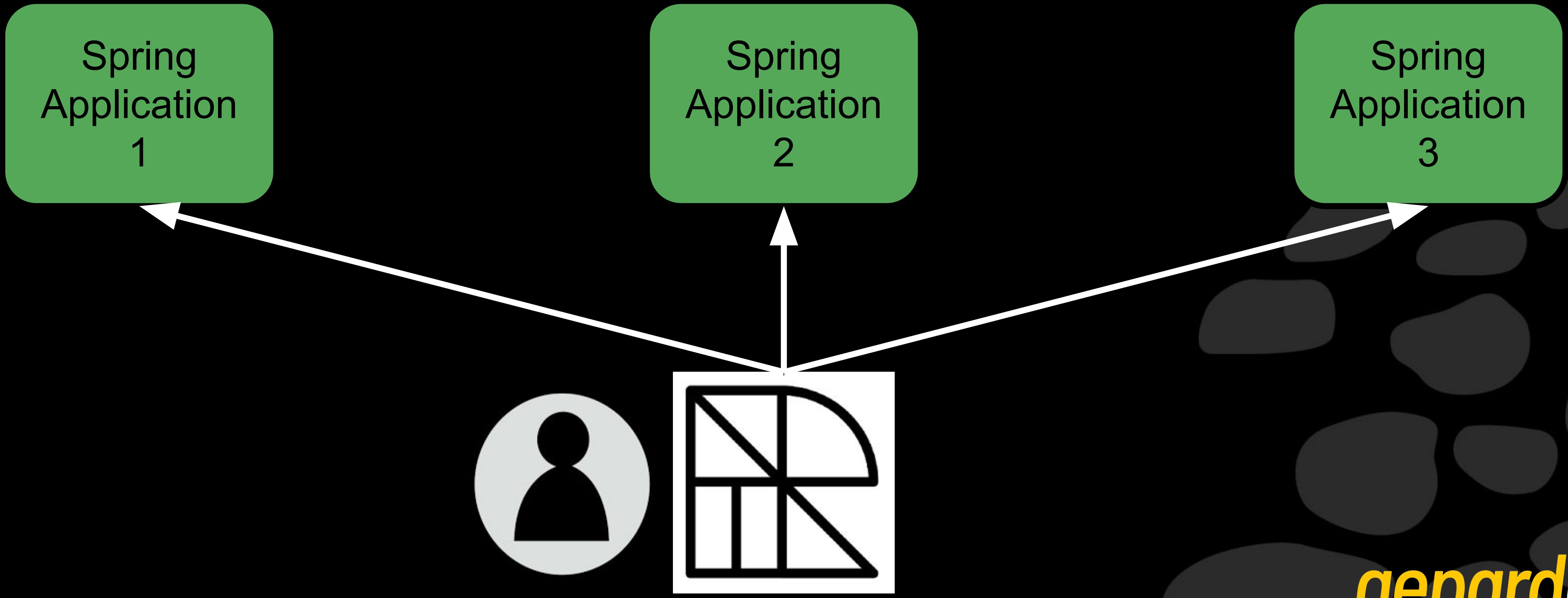
Upgrading manually - Repeated effort



And that's how OpenRewrite got born!



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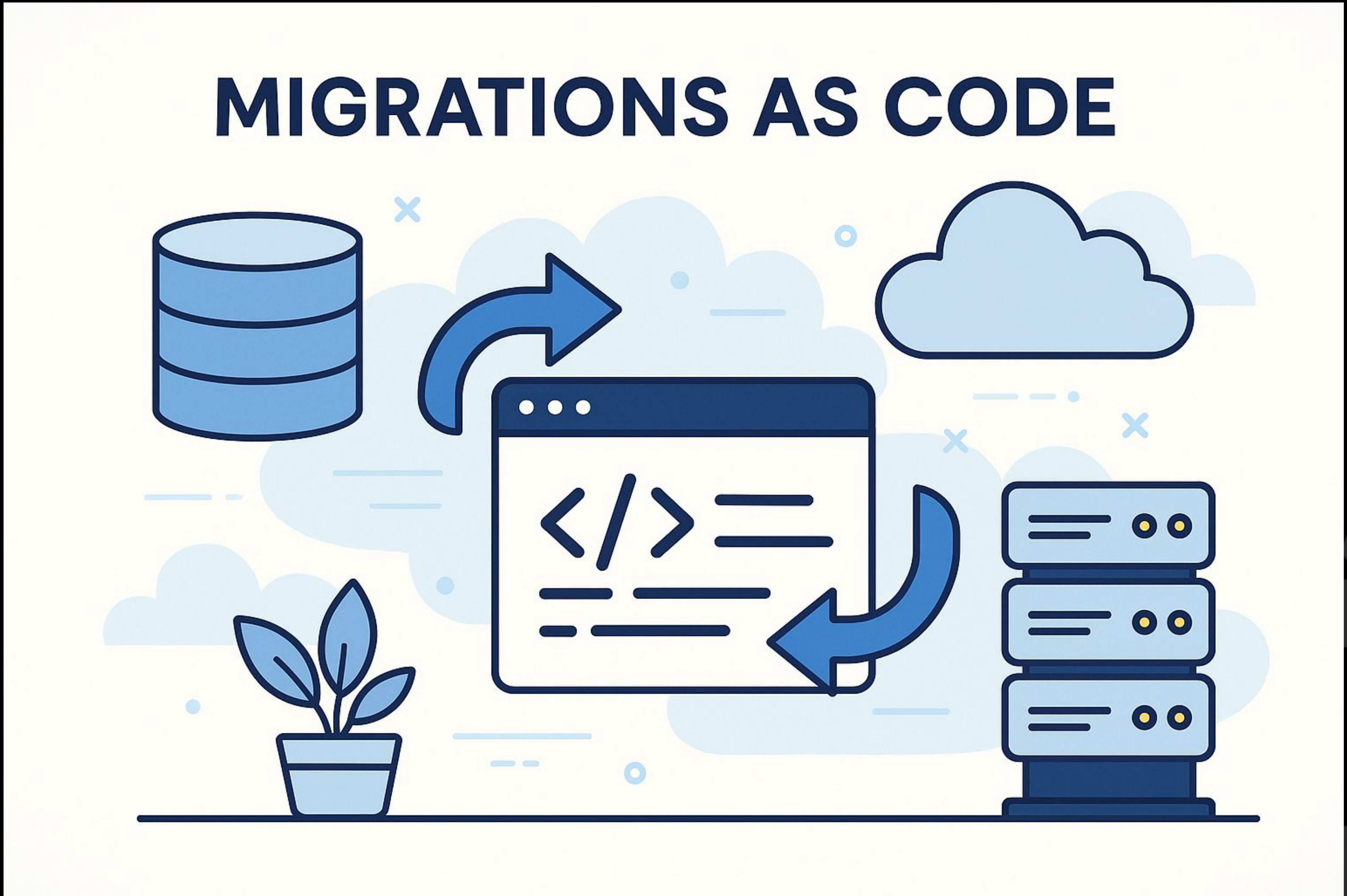
MIGRATIONS AS CODE

Formats supported by OpenRewrite

// Java

// XML / Maven

// Groovy / Gradle

// JSON

// YAML

// Properties

// ...

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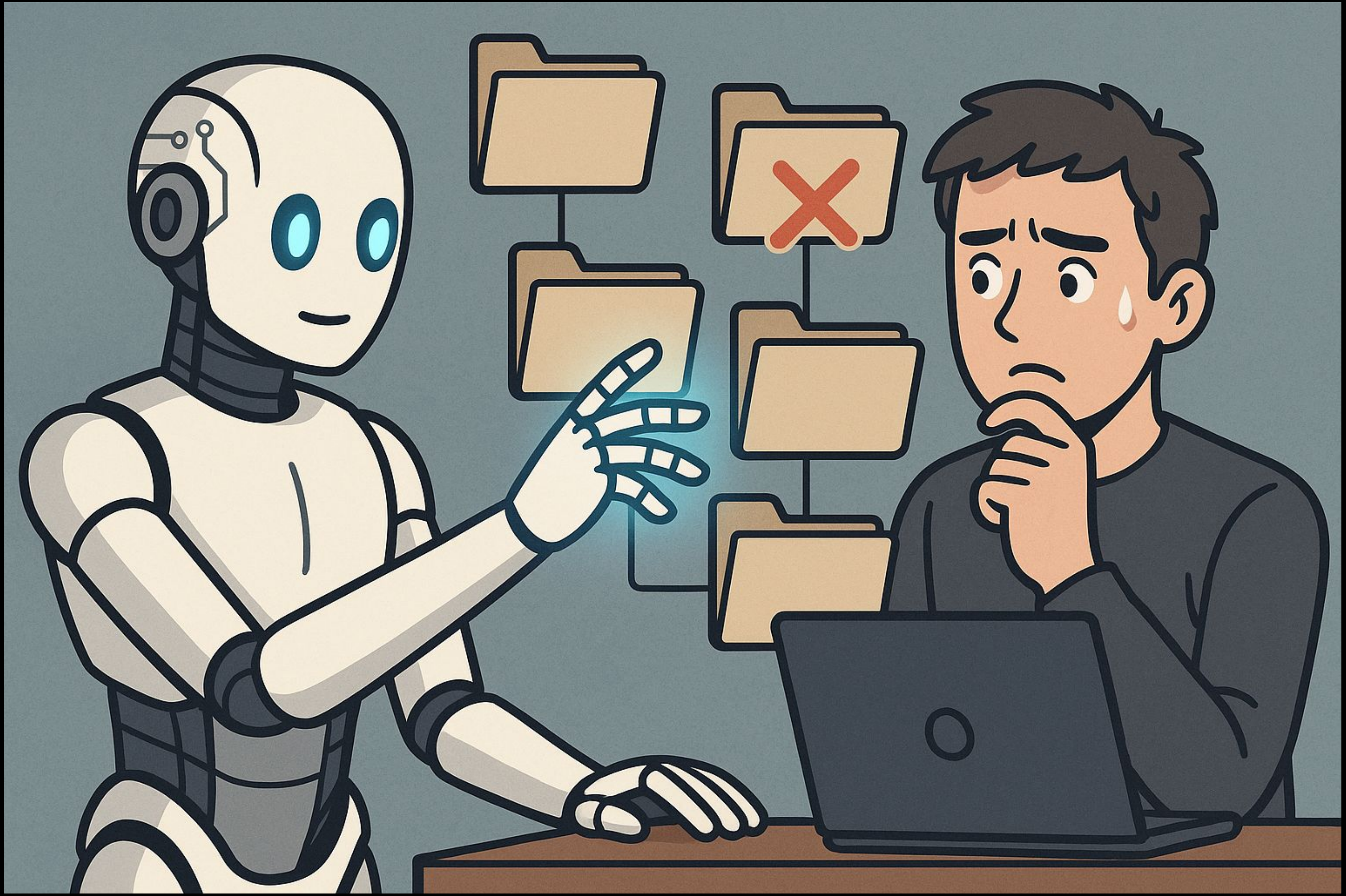
About text replacements

```
public void example() {
  Type x = new Type();
  x.doSomething();
  OtherType y = new OtherType();
  y.doSomething();
}
```

```
public void example() {
  Type x = new Type();
  x.doNothing();
  OtherType y = new OtherType();
  y.doSomething();
}
```

About LLMs



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Recipe Catalog

// List of official Recipes by Moderne / Open Source

https://docs.openrewrite.org/recipes/java/migrate/jakarta/jakartaee11

Composite Recipes

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Another Recipe

https://docs.openrewrite.org/recipes/maven/changedependencygroupidandartifactid

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Other Recipes

// UpgradeDependency

// ChangePropertyValue

// ChangeType

// ReplaceAnnotation

// JakartaEE10

// Slf4jToLog4j

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Framework Migrations

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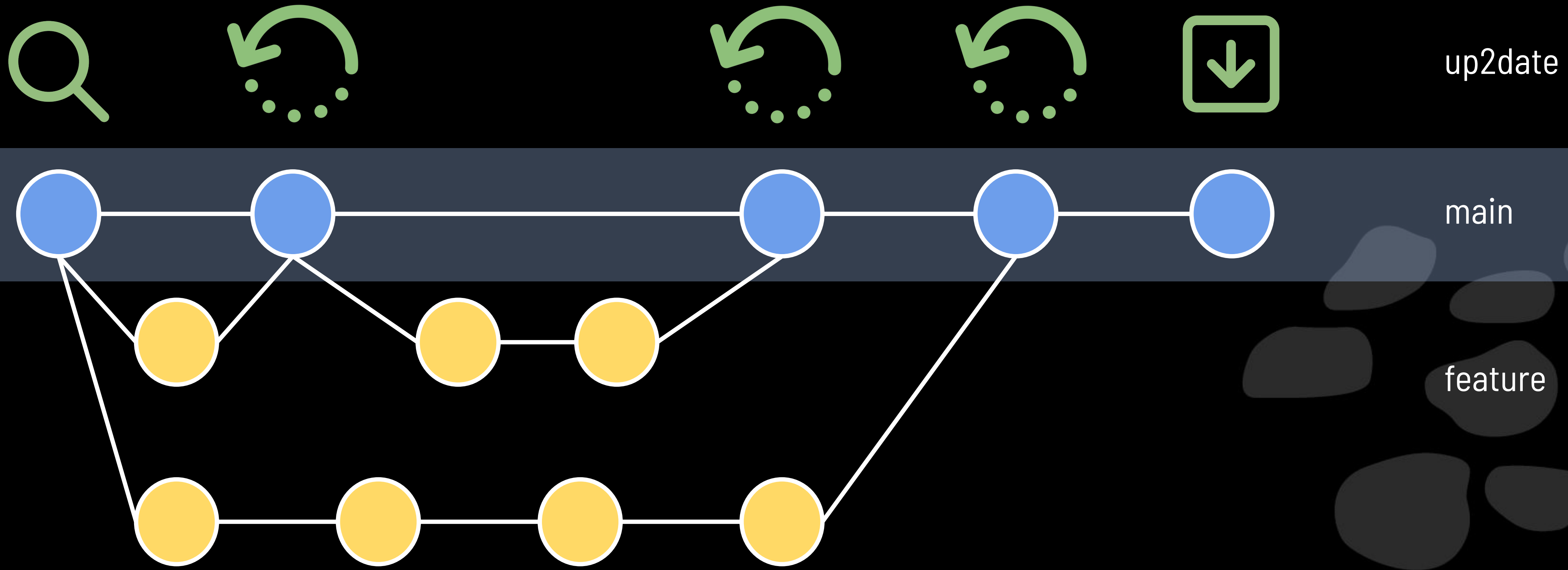
Transformer



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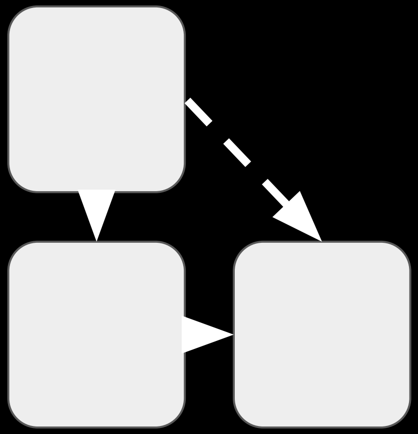
Prerequisites for Framework Migrations



// Transitive dependencies in controlled code?

// Ensure a good test coverage

// Clean up to ease automation

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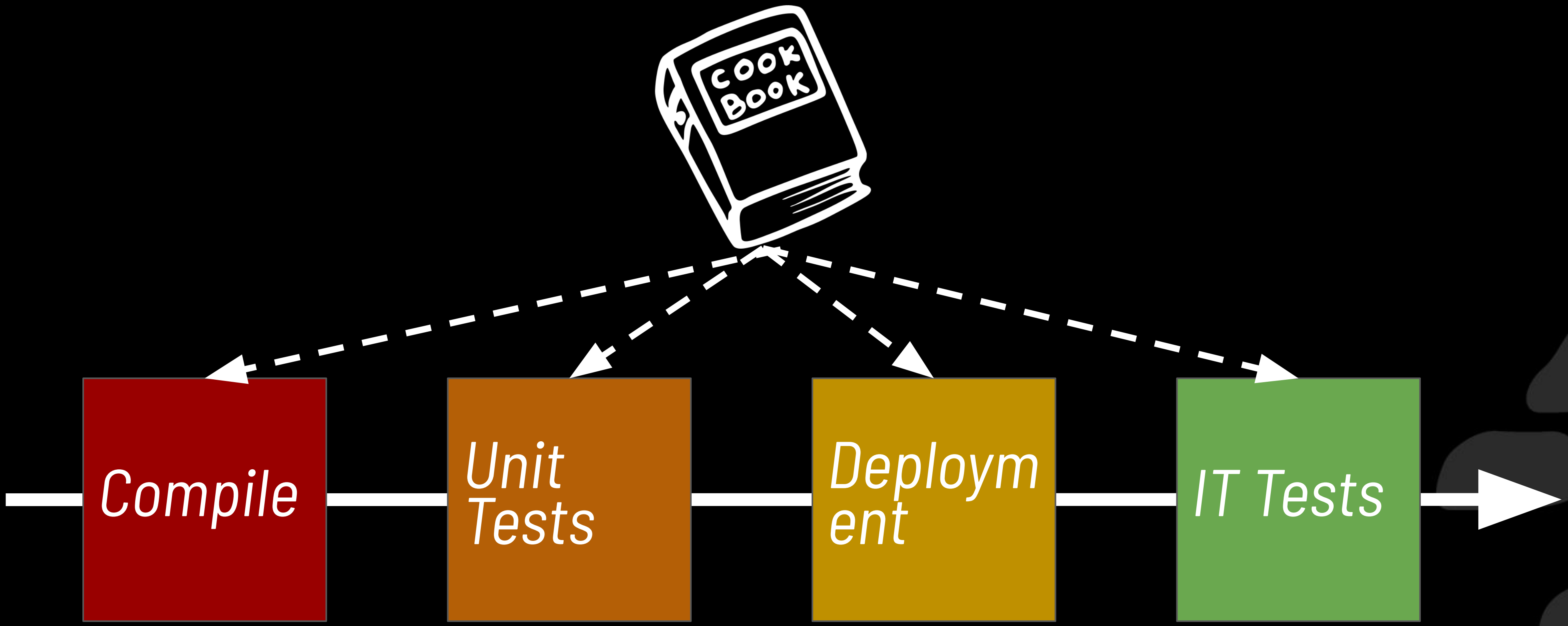
Automating Framework Migrations



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Single Cases

Q: Should I make the effort to integrate specific cases even if they only have one occurrence?

A: Yes! But keep it simple! For example, you could do:

- FindAndReplace
- Replace entire files

Custom Recipes

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Interface transformation

```
request
   .getMetadata()
   .setTenantId(“1”);
```

```
Metadata meta =
ObjectFactory.createMetadata();
JaxbElement<String> tenantId =
   ObjectFactory
     .createMetadataTenantId(“1”);
meta.setTenantId(tenantId);
request.setMetadata(meta);
```

Lossless Semantics Tree (LST)

```
\—-J.ClassDeclaration
    |—-J.Modifier | "public"
    |—-J.Identifier | "Main"
     \—-J.Block
         \———-J.MethodDeclaration | "MethodDeclaration{com.gepardec.Main}"
                 |—-J.Modifier | "public"
                 |—-J.Modifier | "static"
                 |—-J.Primitive | "void"
                 |—-J.Identifier | "main"
                 |——————-J.VariableDeclarations | "String[ ] args"
                  \—-J.Block
                      \———-J.MethodInvocation | "System.out.println("Hello world!")"
                          |———-J.FieldAccess | "System.out"
                          |—-J.Identifier | "println"
                           \——————-J.Literal | ""Hello world!""
```

public class Main {...}

Lossless Semantics Tree (LST)

```
\—-J.ClassDeclaration
   |—-J.Modifier | "public"
   |—-J.Identifier | "Main"
    \—-J.Block
       \———-J.MethodDeclaration | "MethodDeclaration{com.gepardec.Main}"
             |—-J.Modifier | "public"
             |—-J.Modifier | "static"
             |—-J.Primitive | "void"
             |—-J.Identifier | "main"
             |——————-J.VariableDeclarations | "String[ ] args"
             \—-J.Block
                 \———-J.MethodInvocation | "System.out.println("Hello world!")"
                       |———-J.FieldAccess | "System.out"
                       |—-J.Identifier | "println"
                       \———————-J.Literal | ""Hello world!""
```

```
public static void main(String[] args)
{...}
```

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Lossless Semantics Tree (LST)

System.out.println(“Hello world!”);

```
\—-J.ClassDeclaration
   |—-J.Modifier | "public"
   |—-J.Identifier | "Main"
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                       |———-J.FieldAccess | "System.out"
                       |—-J.Identifier | "println"
                       \———————-J.Literal | ""Hello world!""
```

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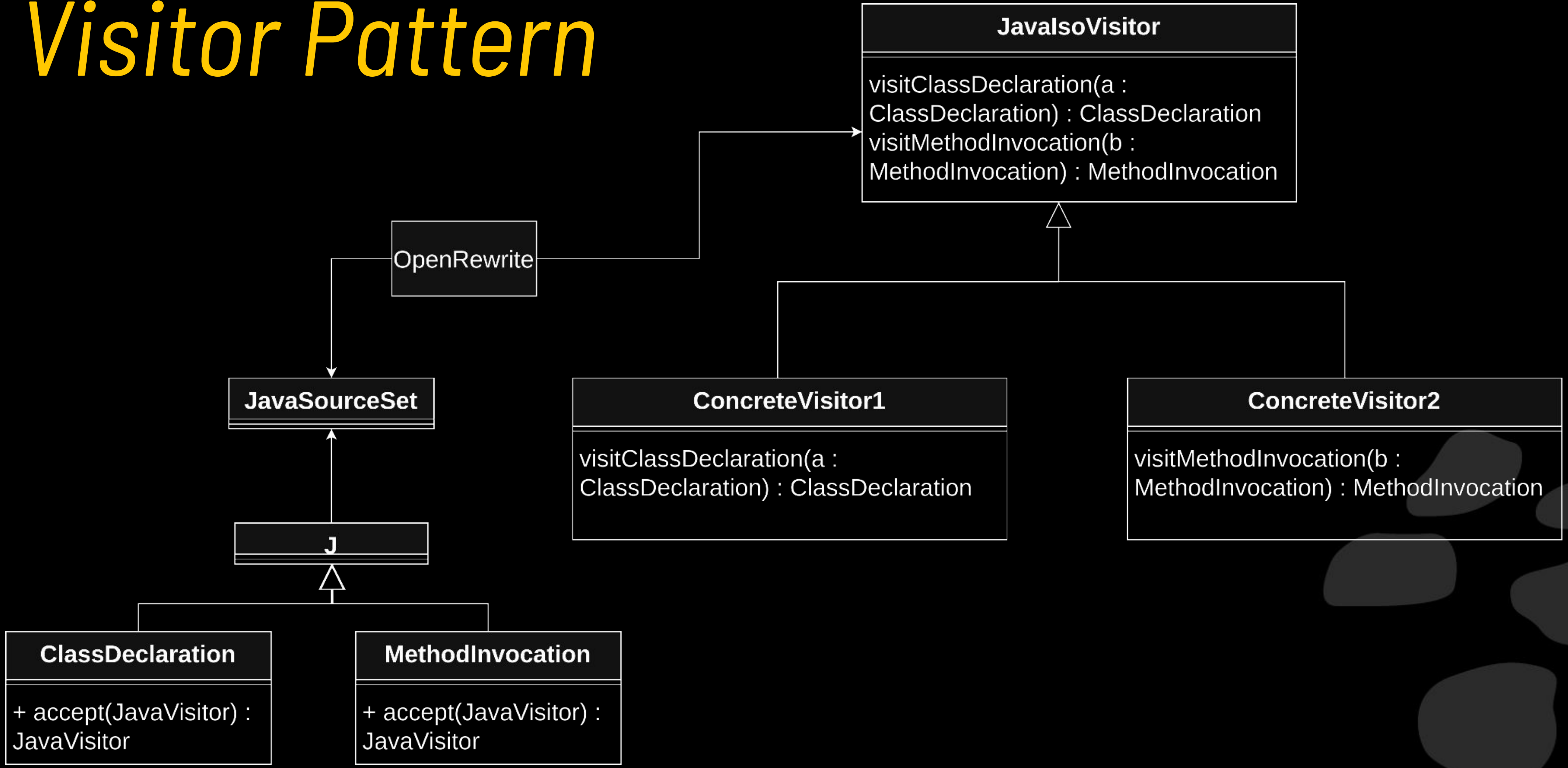
Visitor Pattern


JavaIsoVisitor
visitClassDeclaration(a : ClassDeclaration) : ClassDeclaration
visitMethodInvocation(b : MethodInvocation) : MethodInvocation
OpenRewrite
JavaSourceSet
J
ClassDeclaration
+ accept(JavaVisitor) : JavaVisitor
MethodInvocation
+ accept(JavaVisitor) : JavaVisitor
ConcreteVisitor1
visitClassDeclaration(a : ClassDeclaration) : ClassDeclaration
ConcreteVisitor2
visitMethodInvocation(b : MethodInvocation) : MethodInvocation

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Example for custom recipes

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Interface transformation

```
request
   .getMetadata()
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```
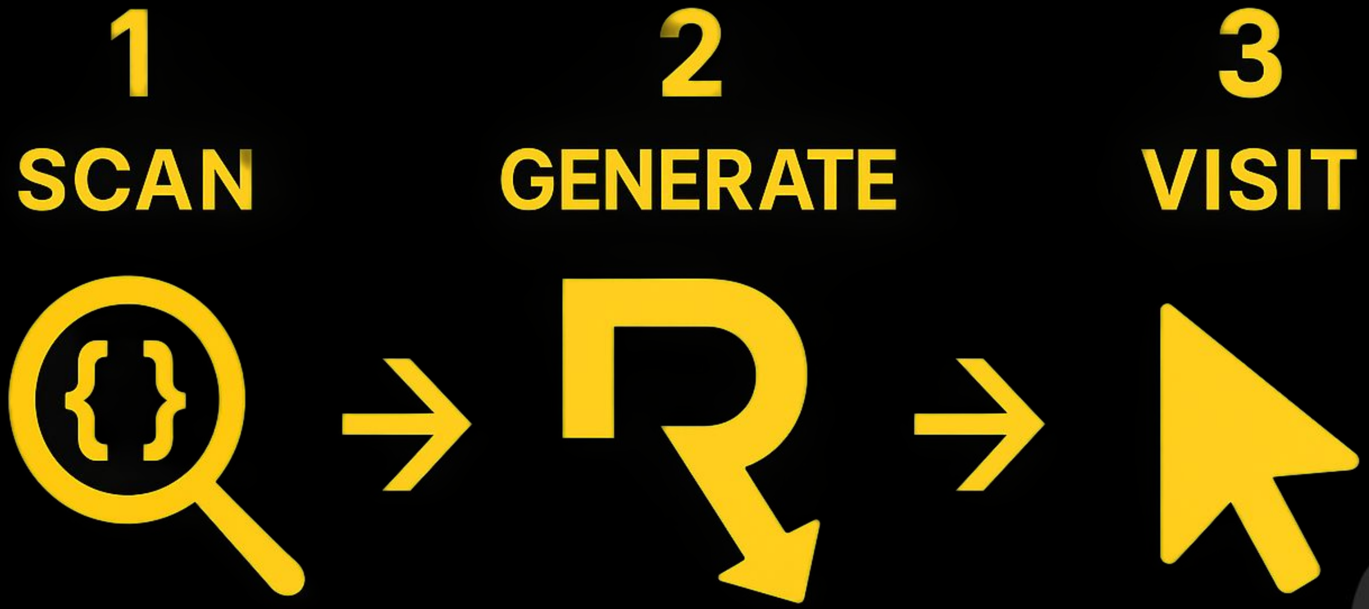

```
Metadata meta =
ObjectFactory.createMetadata();
JaxbElement<String> tenantId =
   ObjectFactory
     .createMetadataTenantId(“1”);
meta.setTenantId(tenantId);
request.setMetadata(meta);
```

Scanning Recipe



// Scan DTO hierarchies and store as Tree

// Lookup DTO in tree and add initialisations + nested setters

Quality Criterias for Recipes

// Type attribution

// Idempotency

// Atomicity

Learning to write Recipes

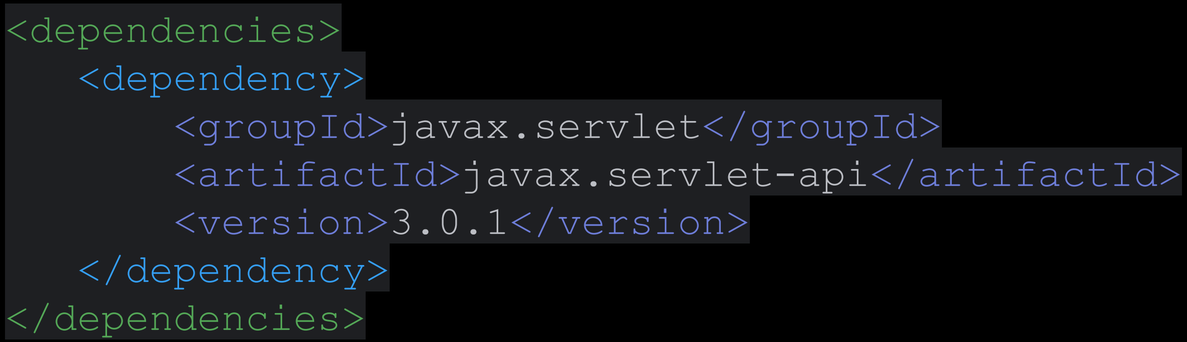
// https://docs.openrewrite.org/authoring-recipes

// https://docs.moderne.io/user-documentation/community-office-hours/

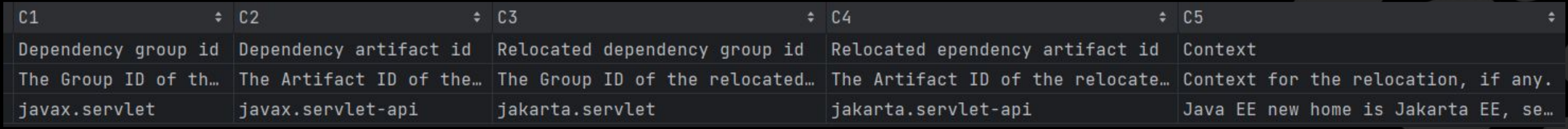
// https://app.moderne.io/recipes/org.openrewrite.java.search.FindMethods

// https://join.slack.com/t/rewriteoss/shared_invite/zt-1ihfggp2a-gllit_aXJnhHAdv_0uzwow

DataTables: RelocatedDependencyCheck



```
<dependencies>
   <dependency>
       <groupId>javax.servlet</groupId>
       <artifactId>javax.servlet-api</artifactId>
       <version>3.0.1</version>
   </dependency>
</dependencies>
```



C1	C2	C3	C4	C5
Dependency group id	Dependency artifact id	Relocated dependency group id	Relocated ependency artifact id	Context
The Group ID of th…	The Artifact ID of the…	The Group ID of the relocated…	The Artifact ID of the relocate…	Context for the relocation, if any.
javax.servlet	javax.servlet-api	jakarta.servlet	jakarta.servlet-api	Java EE new home is Jakarta EE, se…

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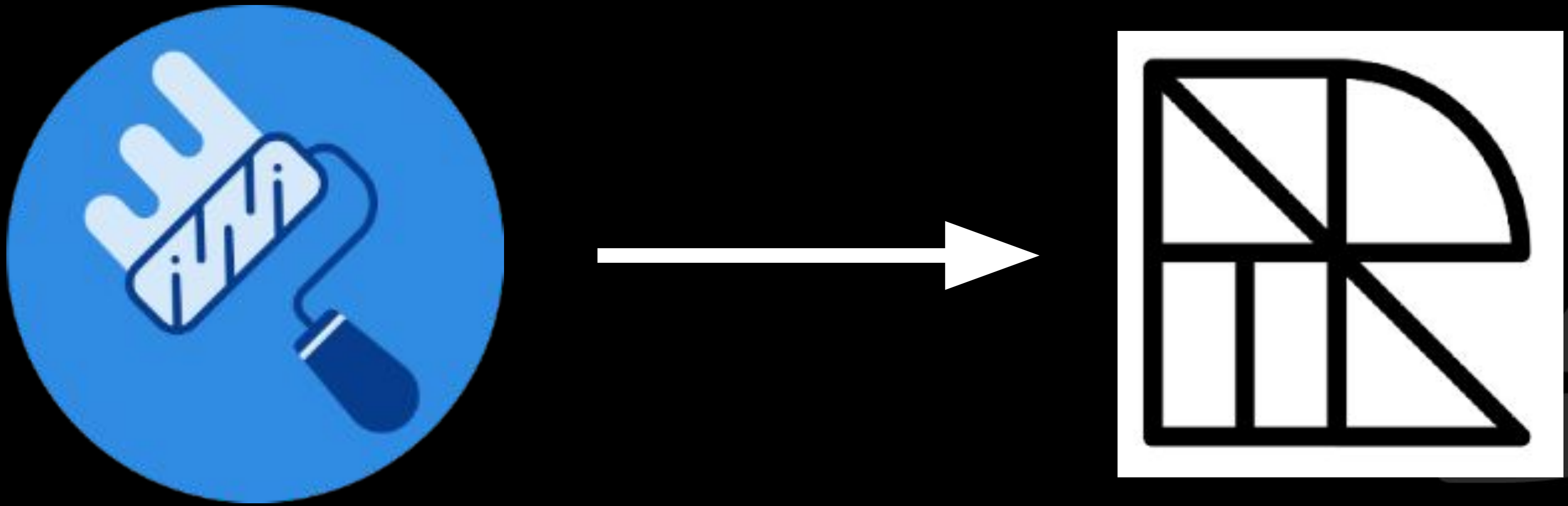
Auto Update Service



// Renovate finds new Updates

// OpenRewrite migrates to a new update

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TQRCG