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Make JDK Migration Easier

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EMT4J Project Maintainer

Agenda

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- EMT4J Introduction
- Migration Workflow
- Internal Usage of EMT4J
- Lesson Learned

EMT4J Introduction

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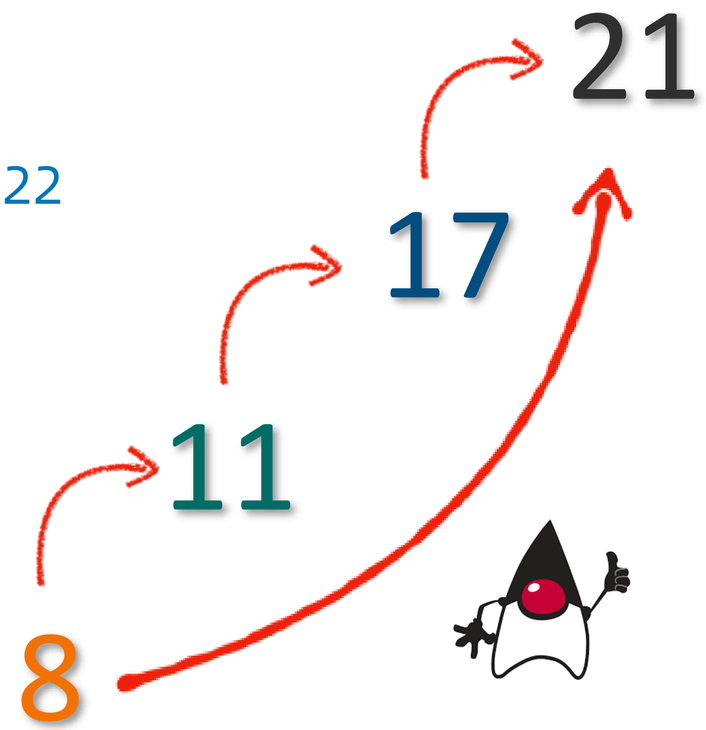
- Open sourced to the Eclipse community by Alibaba in 2022
- Incubated as an Eclipse Adoptium sub-project
- A toolkit to make JDK migration easy



support upgrading to LTS versions

https://projects.eclipse.org/projects/adoptium.emt4j

https://github.com/adoptium/emt4j

Migration Workflow

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Scan project for compatibility problems using EMT4J

Generate autofix patch and report

Apply the auto-fix patch
Fix problems in the report

Run apps using JDK11
Fix other problems

Step 1: Scan Compatibility Issues

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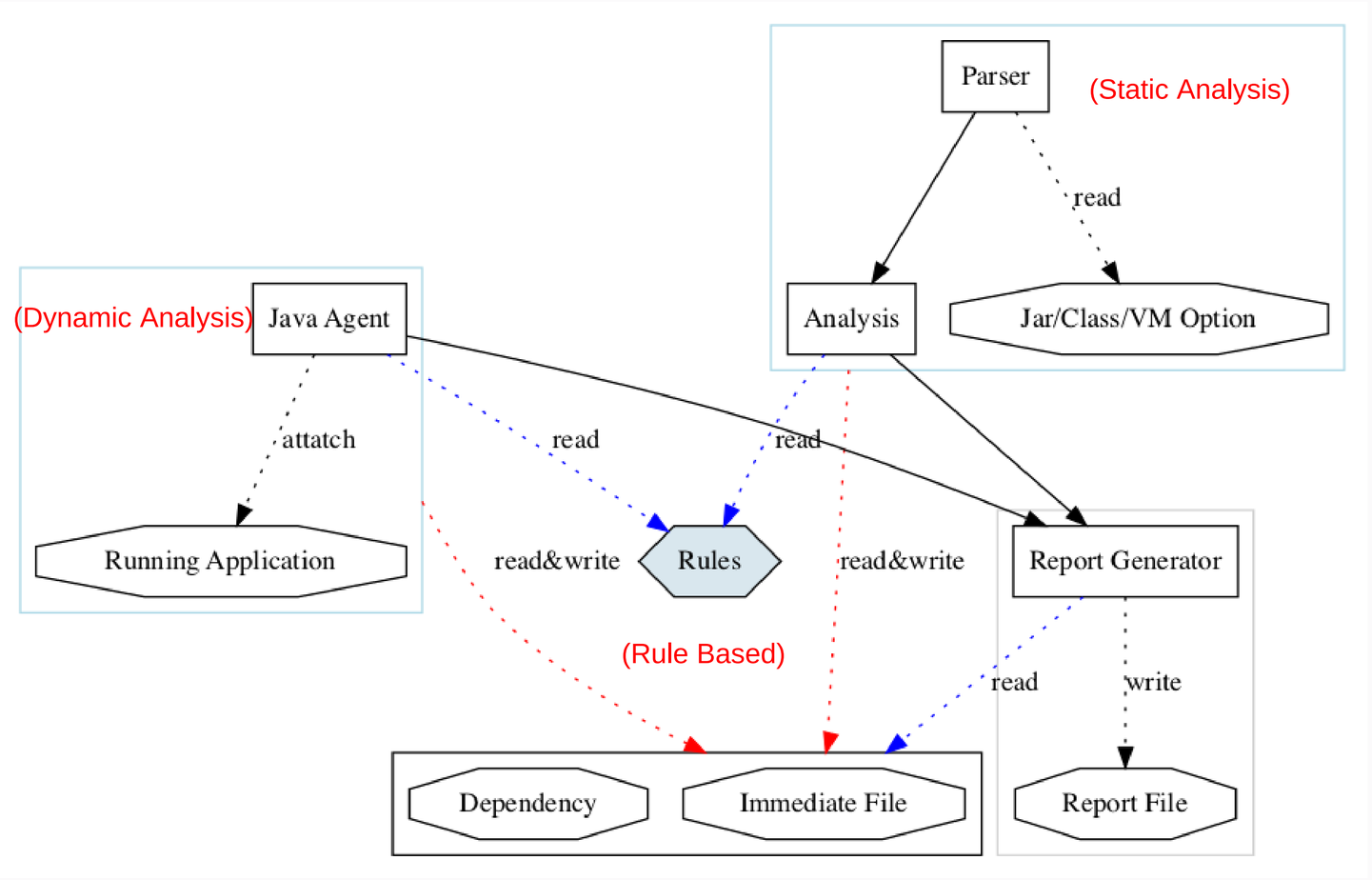
- Rule based
- Static and dynamic analysis
- Maven plugin, Java agent, API



Step 2: Autofix

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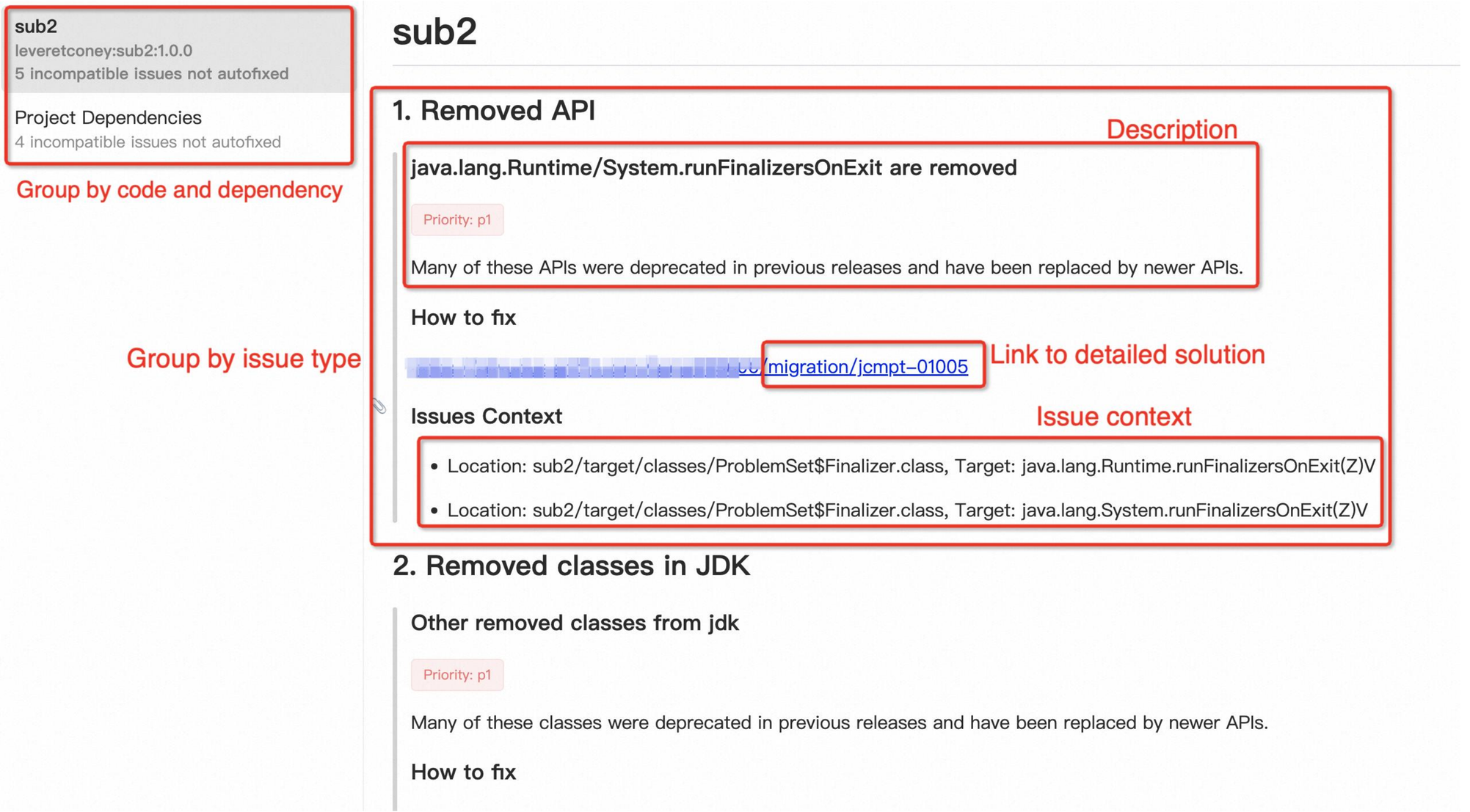
Automatically fix Java code, dependencies, build & deploy scripts, JVM options

```
140 diff --git a/migration-demo-playground/src/main/java/com/alibaba/jvm/playground/ProblemSet.java b/migration-demo-playground/src/main/java/com/alibaba/jvm/playground/ProblemSet.java
141 index 8b05b81..036b4a5 100644
142 --- a/migration-demo-playground/src/main/java/com/alibaba/jvm/playground/ProblemSet.java
143 +++ b/migration-demo-playground/src/main/java/com/alibaba/jvm/playground/ProblemSet.java
144 @@ -130,7 +130,7 @@ org.openrewrite.config.CompositeRecipe
145
146          @Override
147          public void produce() {
148 -            String[] clazz = (String[]) Arrays.asList(new String[]{"a"}).toArray();
149 +            String[] clazz = Arrays.asList(new String[]{"a"}).toArray(new String[0]);
150
151              Object[] objects = Arrays.asList(new String[]{"a"}).toArray();
152
153
154 diff --git a/migration-demo-playground/pom.xml b/migration-demo-playground/pom.xml
155 index e15fc43..801ecad 100644
156 --- a/migration-demo-playground/pom.xml
157 +++ b/migration-demo-playground/pom.xml
158 @@ -23,25 +23,25 @@ org.openrewrite.config.CompositeRecipe
159          <dependency>
160              <groupId>org.codehaus.groovy</groupId>
161              <artifactId>groovy-all</artifactId>
162 -            <version>2.4.21</version>
163 +            <version>2.5.0</version>
164          </dependency>
```

Fix Java Incompatible Issue

Update Dependency Version

Step 3: Read Report & Manually Fix



Step 4: Test & Publish

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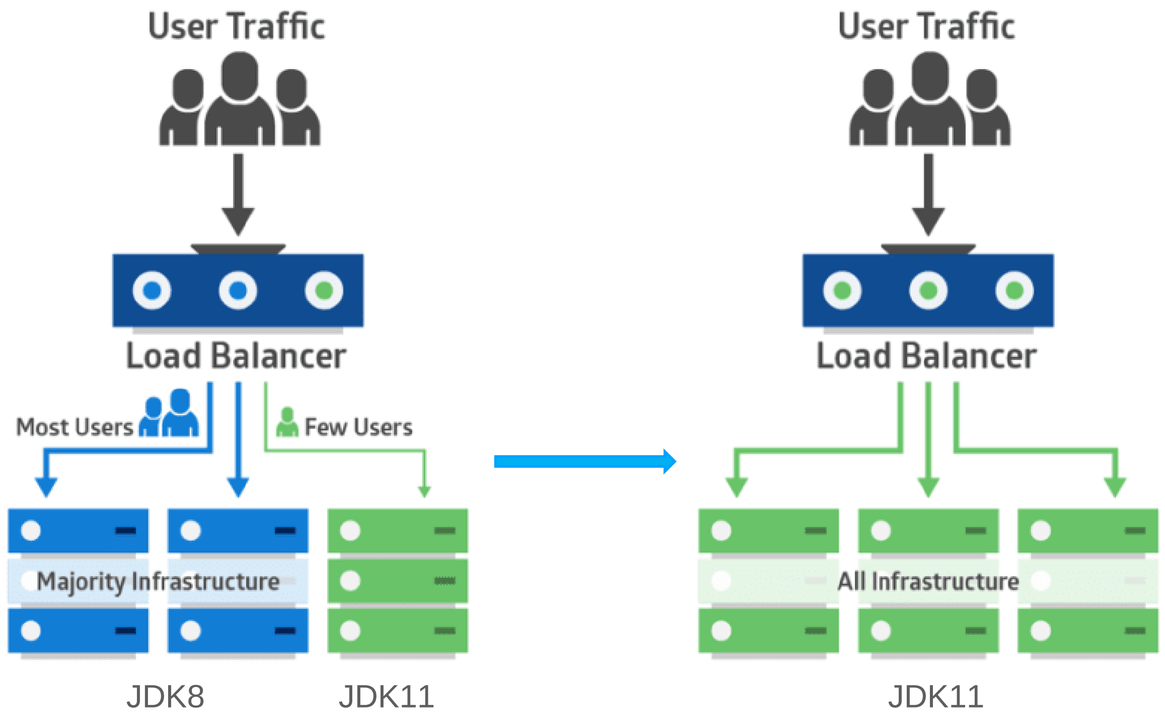
Canary Deployment



- Need days ~ weeks
- Need JDK team and middleware team assistance

Internal Usage of EMT4J

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- Integrated into Alibaba’s DevOps platform, provide smooth migration process for almost all online applications
- Scan 6,000,000+ JARs in total, 1000+ jars every day, provide compatibility information in our Maven repository
- Scan application or JAR before publishing, give warning or prevent incompatible publication

Lesson Learned

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- Tooling support is very important
  - ✓ Applications are generally very complicated (1000+ dependencies)
  - ✓ Documentation not enough & manual migration is very hard (average 1 week)
- Manage the project dependencies carefully
  - ✓ Determine the version to upgrade
    - ✓ Not simply upgrading version, but thinking about API change, configuration change, dependency conflicts

Notes: EMT4J has been adapted to support common dependencies upgrading, e.g: Lombok, Maven Compiler Plugin

Lesson Learned（II)

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- Standardizing the development & deployment of application
  - ✓ Unify project structure and technology stack (Dockerfile, Middleware version etc.)
  - ✓ Create applications from unified template (JVM options, build scripts)

Notes: The unified deployment model is to simplify EMT4J’s adaption to your projects and easy for support from JDK & middleware team.

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THANKS