

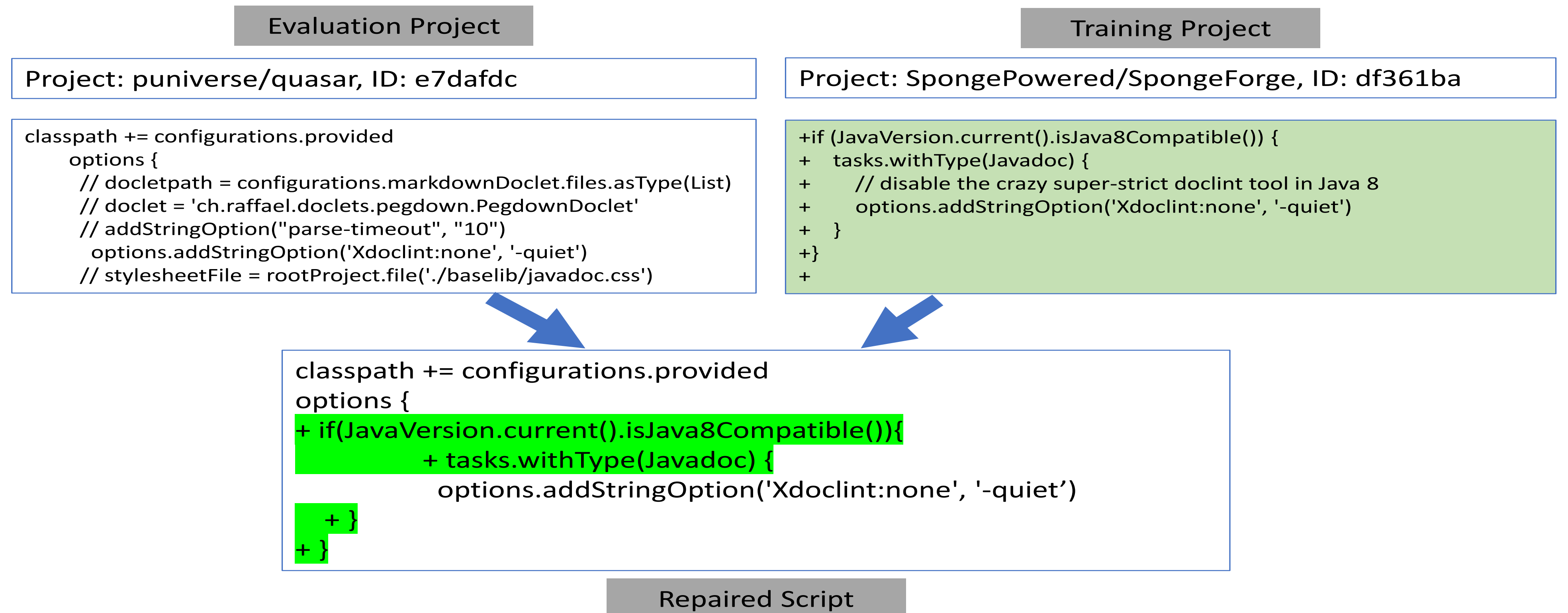
HIREBUILD: AN AUTOMATIC APPROACH TO HISTORY DRIVEN REPAIR OF BUILD SCRIPTS

{ FOYZUL HASSAN AND XIAOYIN WANG } UNIVERSITY OF TEXAS AT SAN ANTONIO

PROBLEM STATEMENT

1. According to the TravisTorrent dataset, 22% of code commits include changes in build script files to maintain build scripts or to resolve build failures.
2. Program repair techniques mostly focus on repairing source code so that they cannot directly help resolving software build failures.
3. We proposed the first approach to automatic patch generation for build scripts, using fix patterns automatically generated from existing build script fixes and recommending fix patterns based on build log similarity.

EXAMPLE



HIREBUILD OVERVIEW

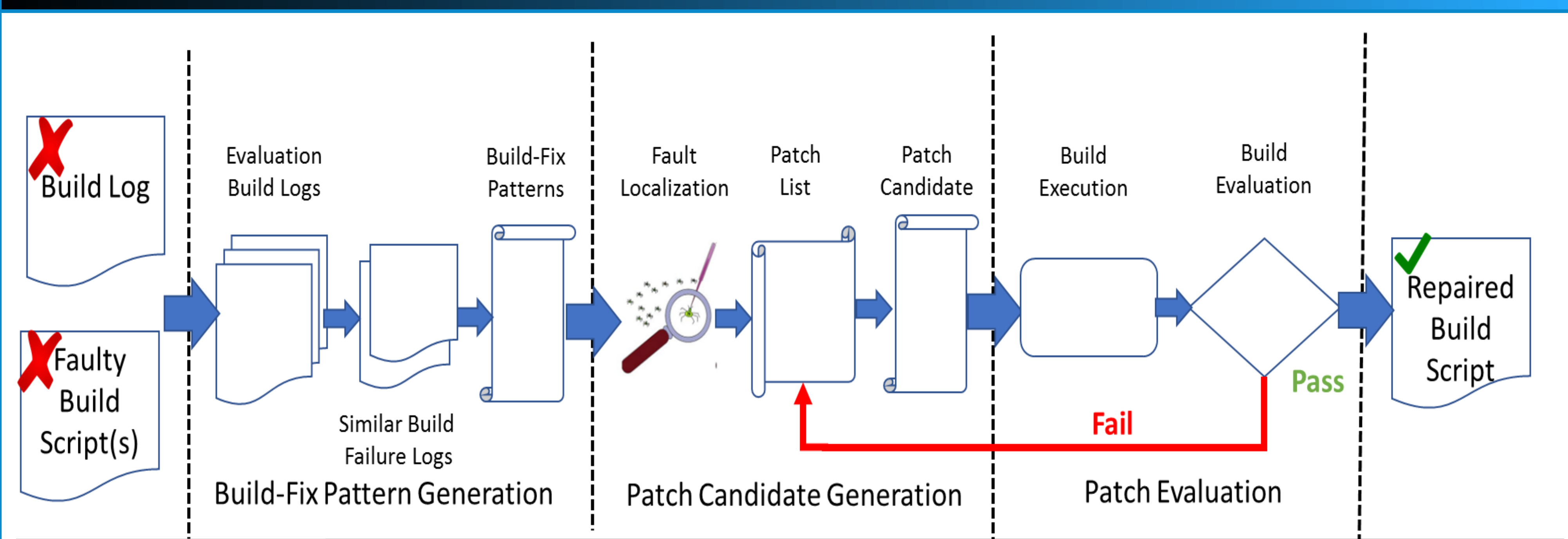


Figure 1: Overview of Proposed System

DATA DESCRIPTION

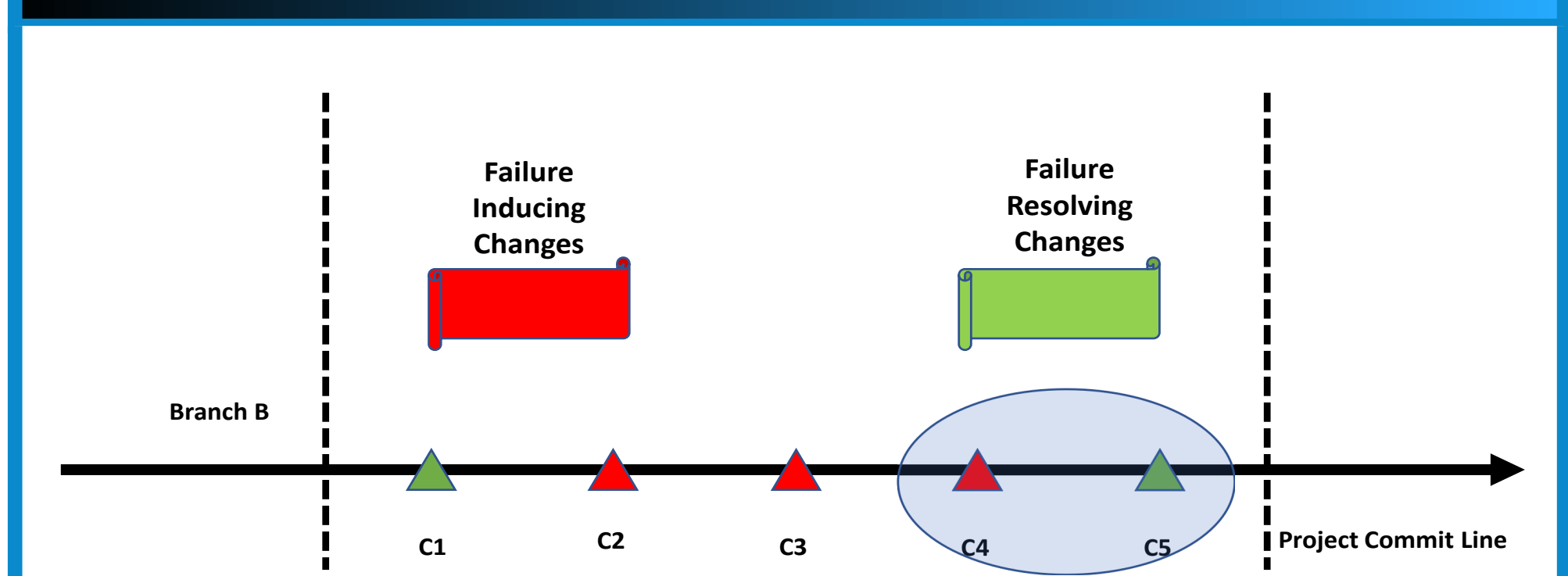


Figure 2: Data Selection Process

- Total Number of Fix 175
- Training Fix Size 135
- Testing Fix Size 40
- Reproducible Build Failure Size for Testing 24

EVALUATION RESULT

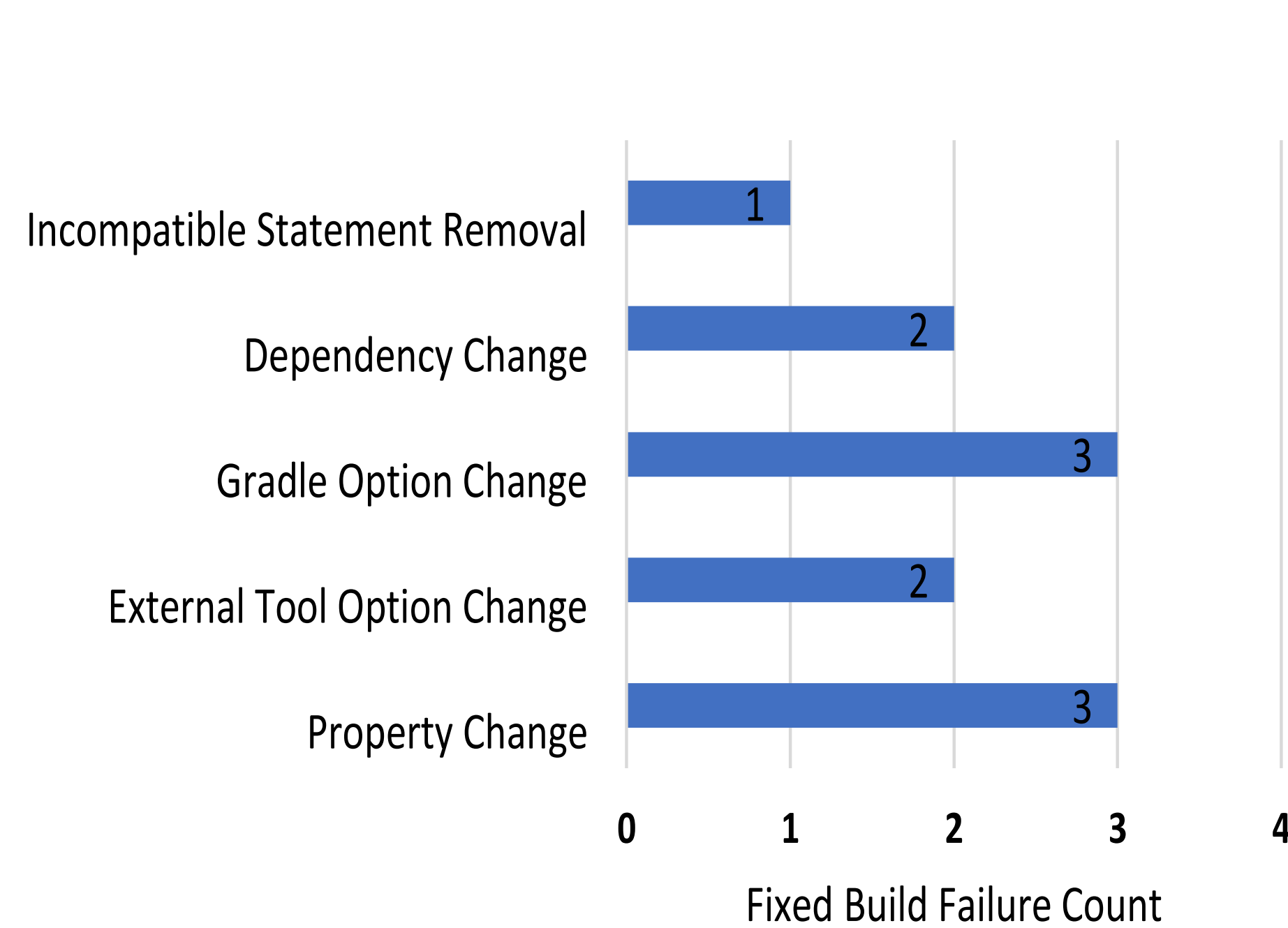


Figure 3: No of Successfully fixed build failures
11 of 24(45.83%)Reproducible Build Failures Can Be Fixed Successfully

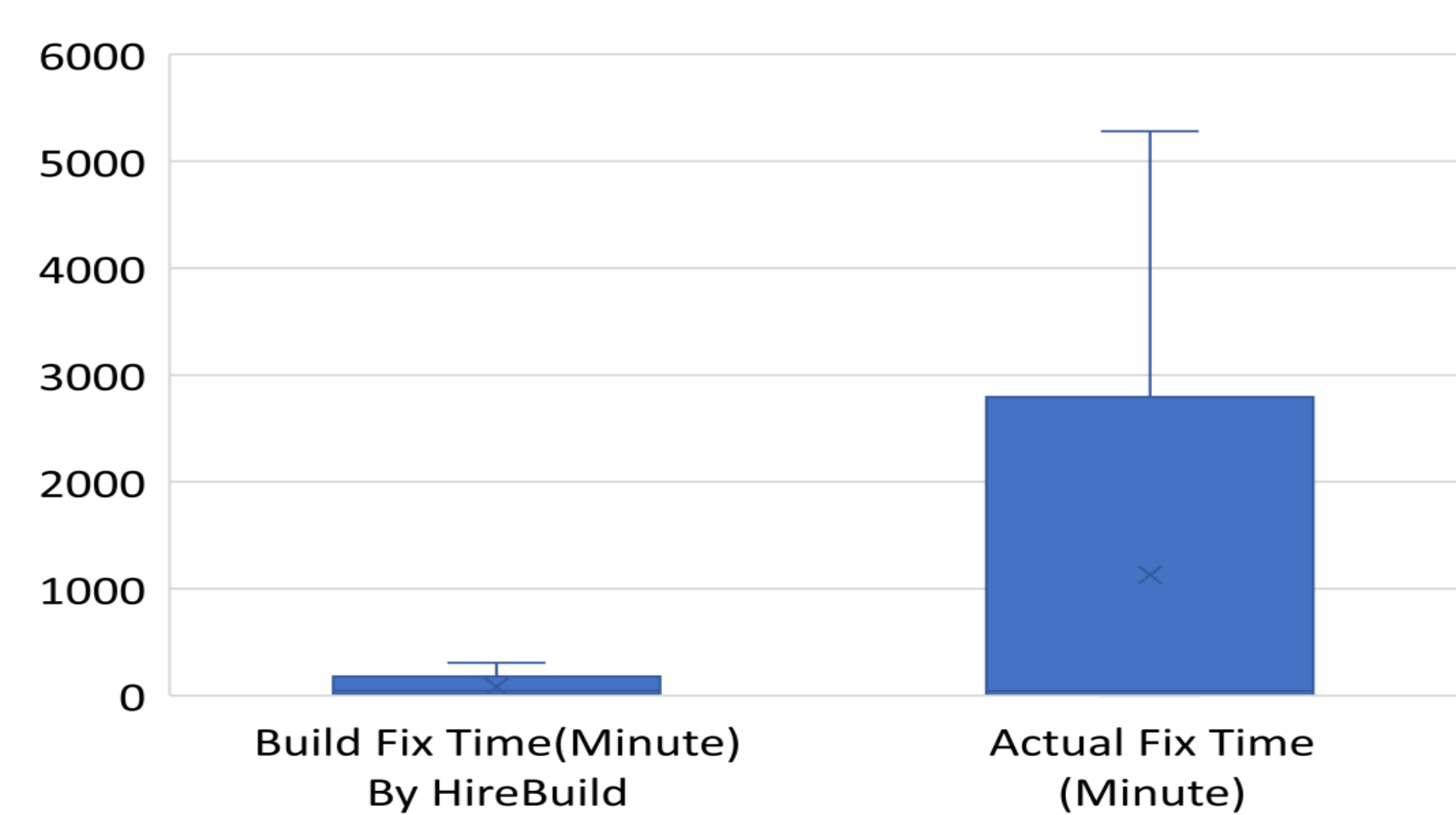


Figure 4: Time Required for Fix

HireBuild Fix Time:
Minimum-2,Maximum-305,Median-44
Actual Fix Time:
Minimum-<1,Maximum-5,281,Median-42

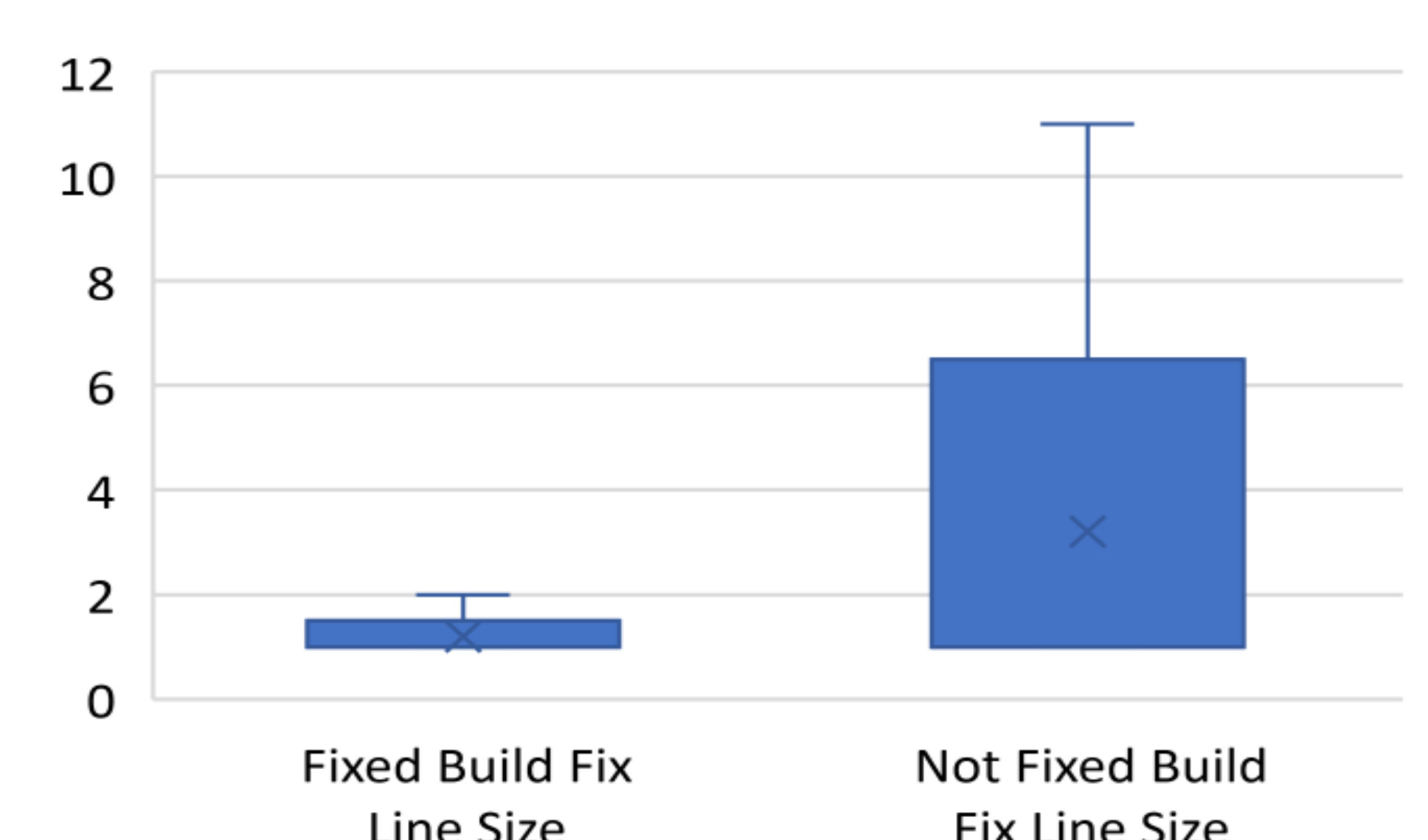


Figure 5: Build Fix Size

Fixed Build Failures Line Size:
Minimum-1, Maximum-2, Median-1
Not Fixed Build Failures Line Size:
Minimum-1, Maximum- 11, Median-1

UNSUCCESSFULNESS

- Project specific change adaption 2(15%)
- No matching patterns 6(46%)
- Dependency resolution failures 3(23%)
- Multi-location fixes 2(15%)

Project specific change (Netflix/Hystrix:6600947)

```
+ if ( dep.moduleName == 'servlet-api' ) {
+ it.artifactId[0].text() == dep.moduleName
&&
+ asNode().dependencies[0].dependency.find{
+ ...
+ }}
+ }
```

LIMITATIONS

- Evaluated on Small data-set.
- Our work only works on build script related fixing. But build fix might also requires source code change.
- HireBuild applies one patch at a time. But actual fix can combination of multiple patches.

FUTURE WORK

- Enhance Build Fix data set with both build script and source file change.
- Apply search based technique such as genetic programming for better ranking of generated patches and apply combination of patches.
- A complete tool suite to fix both build script and source file related build fix.