

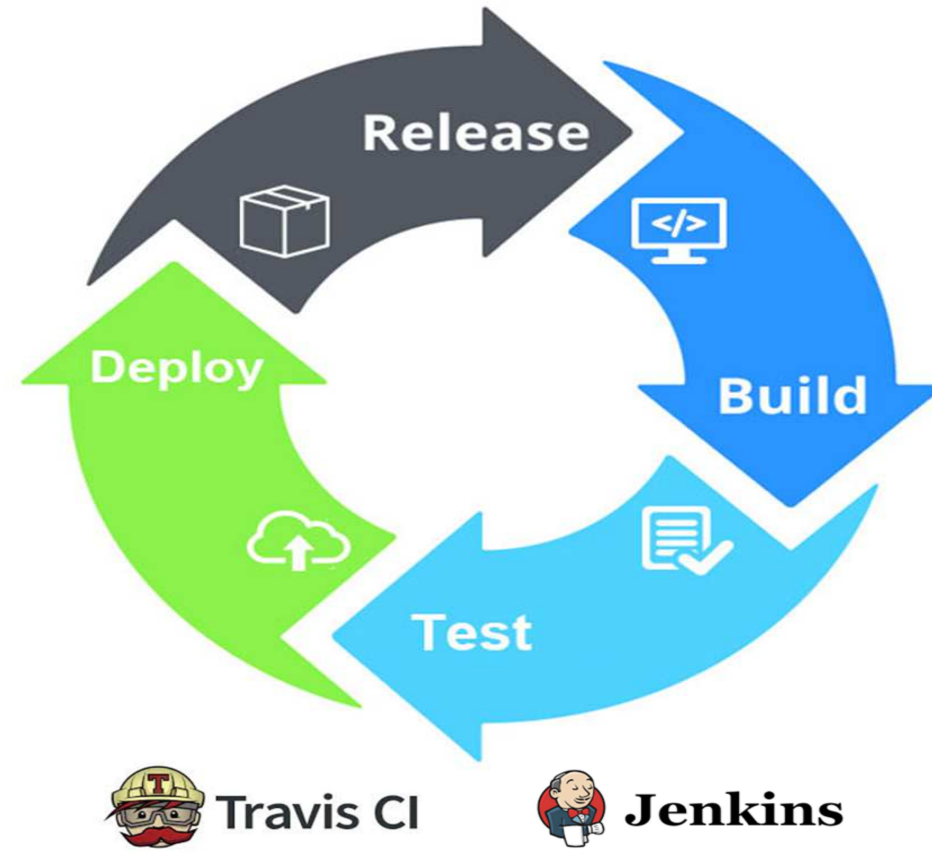
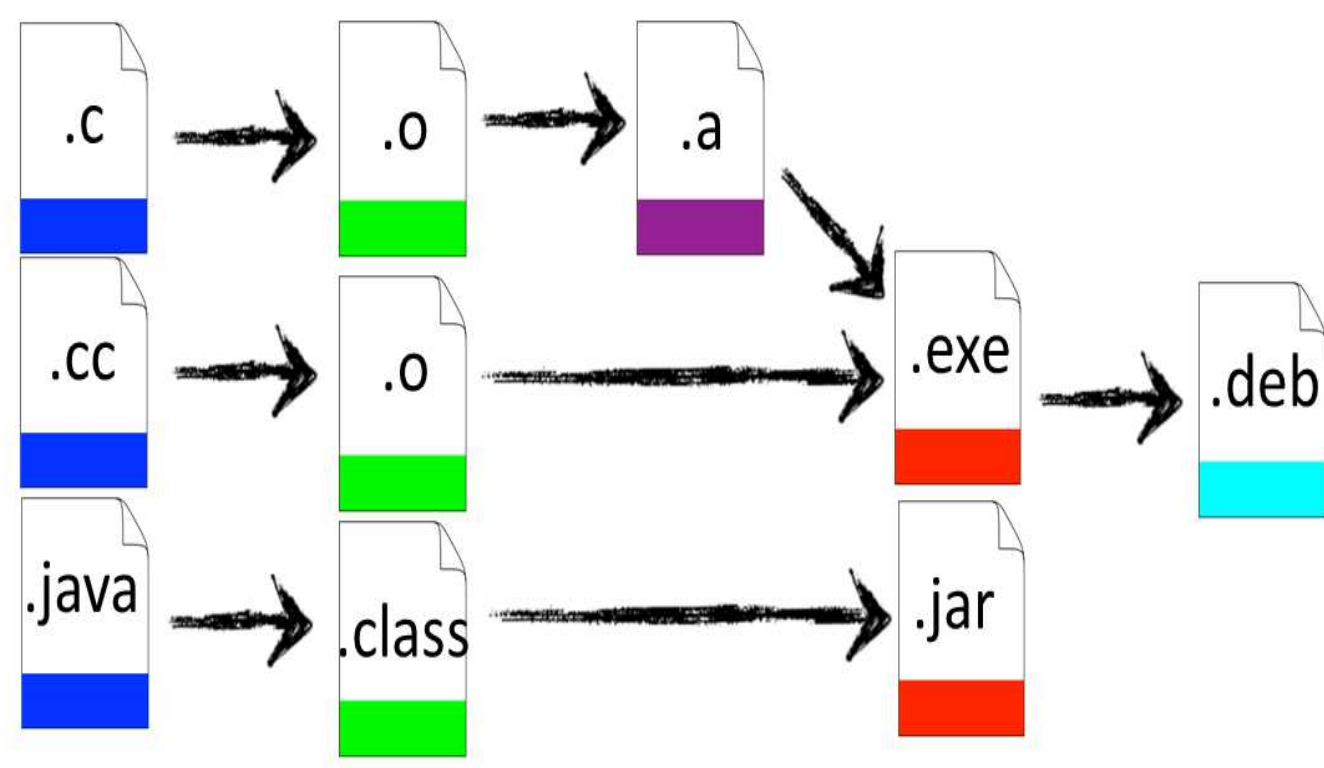
TACKLING BUILD FAILURES IN CONTINUOUS INTEGRATION

INTEGRATION

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BUILD SYSTEMS AND CONTINUOUS INTEGRATION (CI)

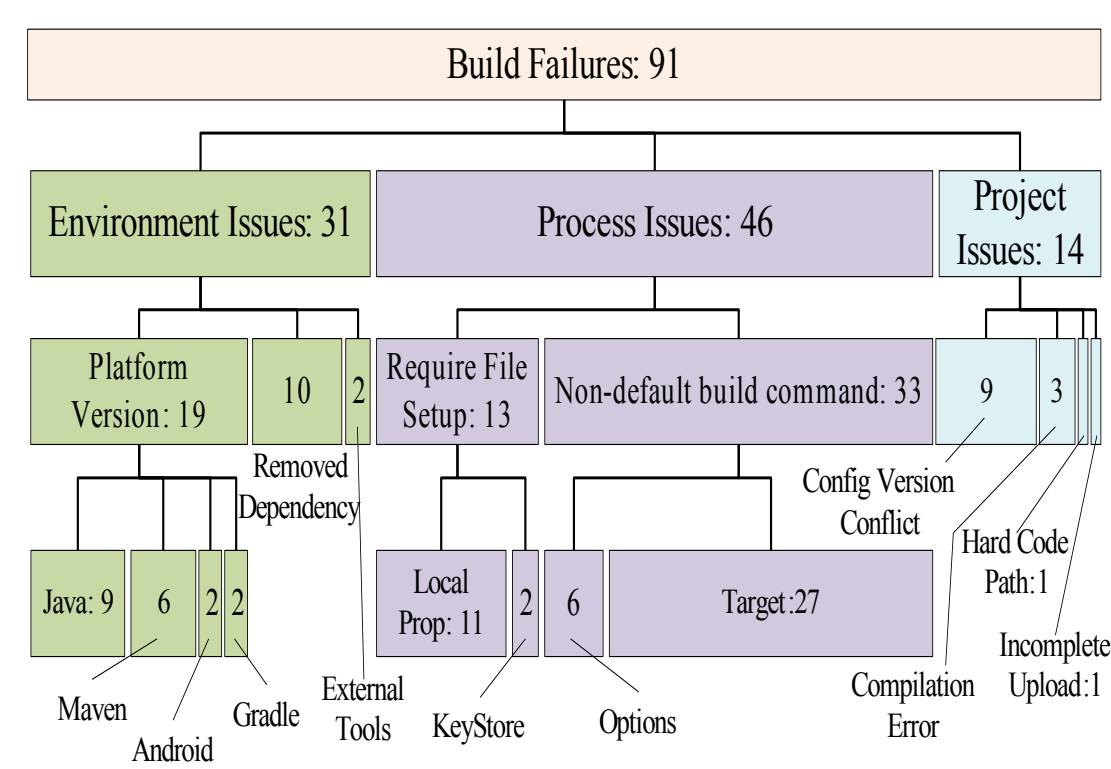


Build systems describe how sources are translated into deliverables.

Continuous Integration (CI) is a widely used development practice for faster code integration and deployment. *The build system is at the heart of processes in Continuous Integration.*

- According to TravisTorrent data-set, 29% of code commits fail to go through successful build on the integration server.
- Study of Java Build system shows 27% of source code work items require an accompanying change to the build system.
- At Google, 37.4% and 29.7% of C++ and Java builds fail.
- Study on TravisTorrent data-set shows that 20% of code commit waits at the build queue.

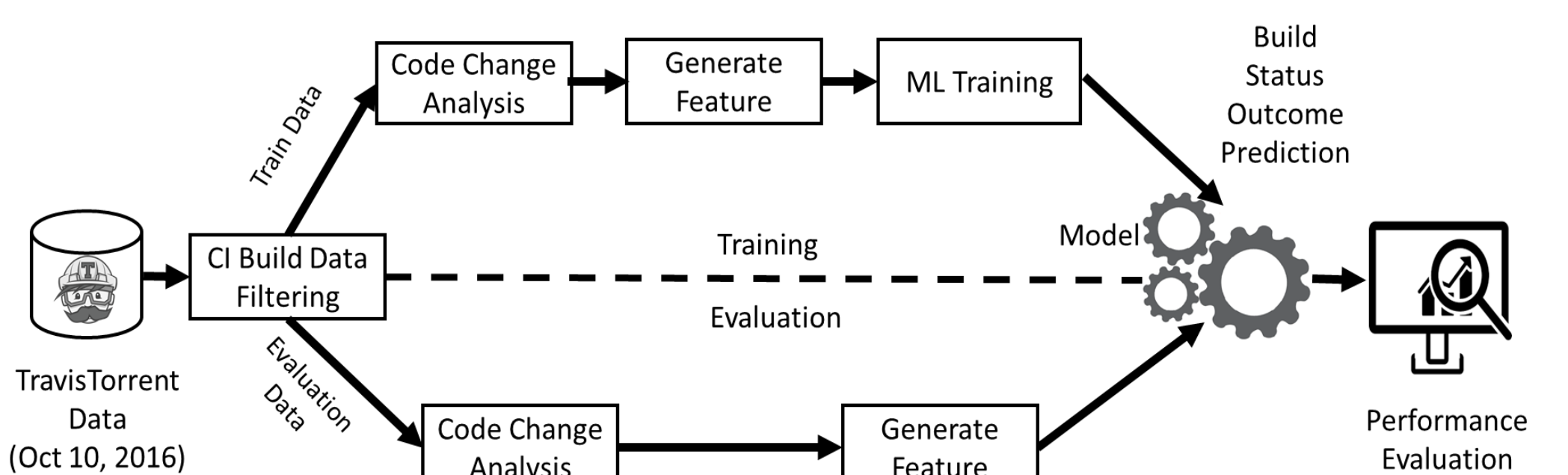
STUDY ON BUILD FAILURES (ESEM'17)



Build Failure Hierarchy of top 200 GitHub Java Projects.

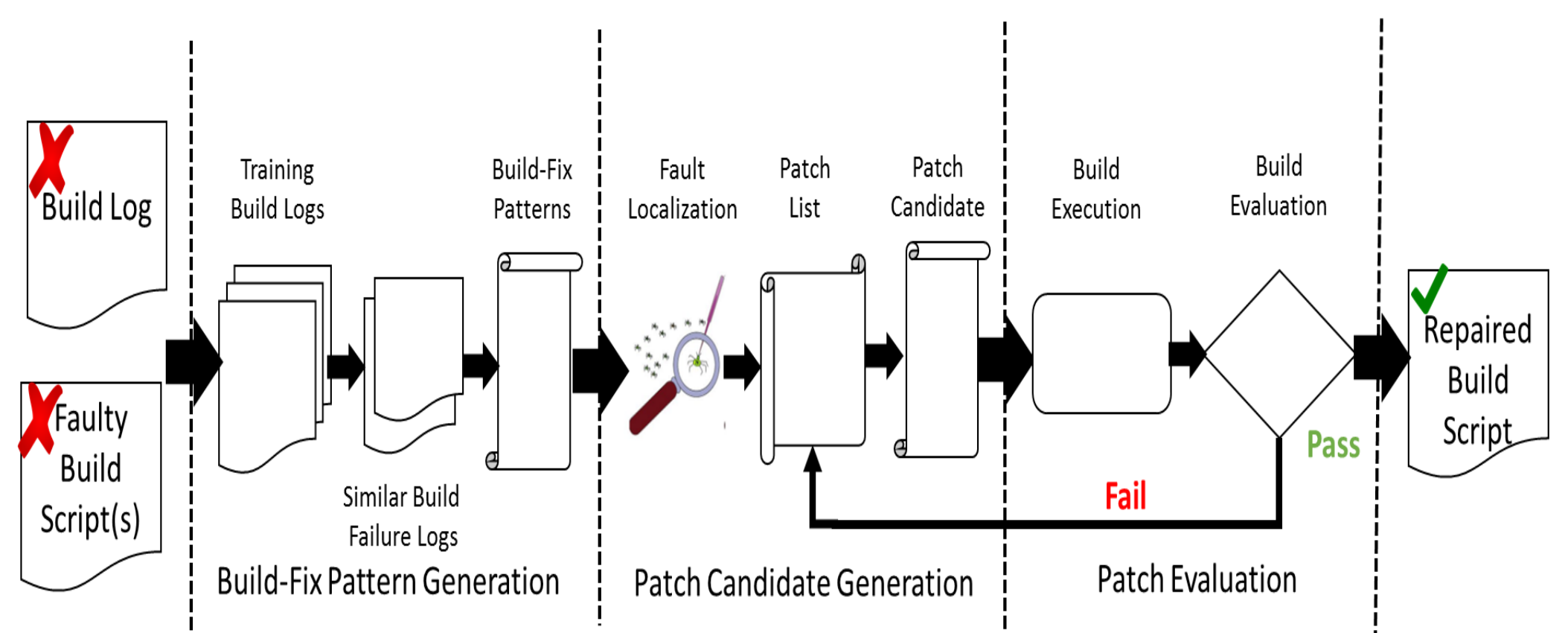
- Half of the top Java projects cannot be straightforwardly built with default build commands.
- Among the 86 projects with build failures, 52 projects can be repaired with different approaches.
- Our study has also identified several build failure categories whose automatic resolution can be difficult.

BUILD PREDICTION IN CI (ESEM'17)

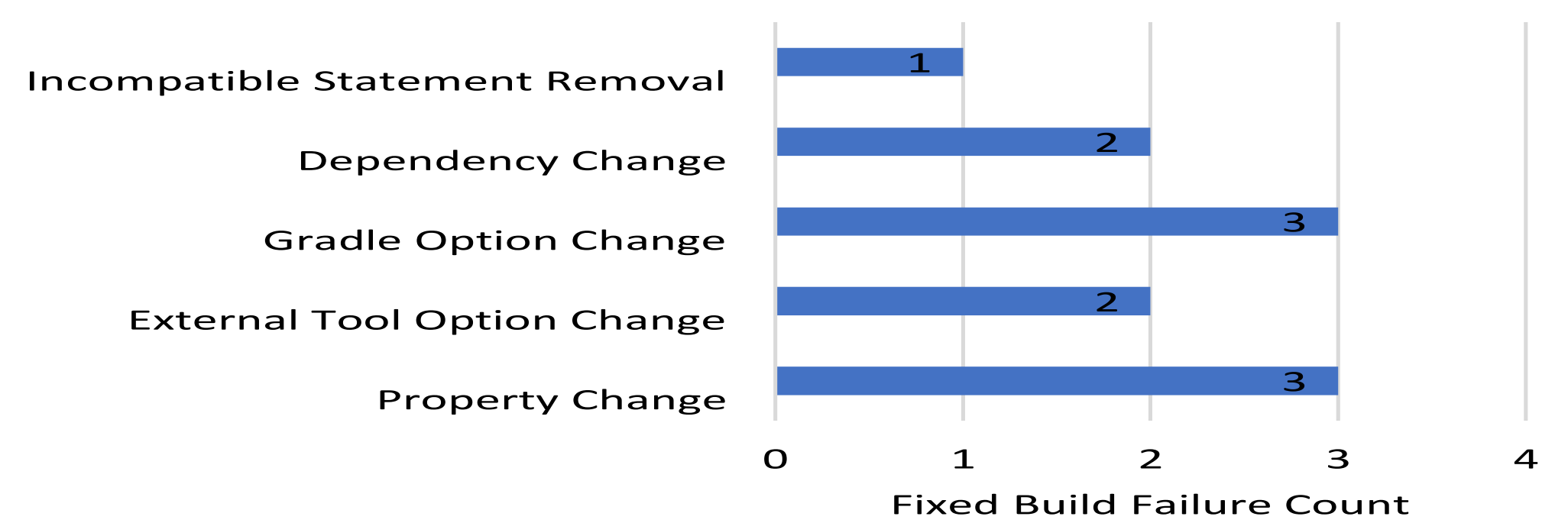


- Data set includes 402 Java projects with data for 256,055 build instances.
- Build prediction model with over 87% F-Measure for all build systems in CI environment.

HIREBUILD: HISTORY-DRIVEN REPAIR OF BUILD SCRIPTS (ICSE'18)

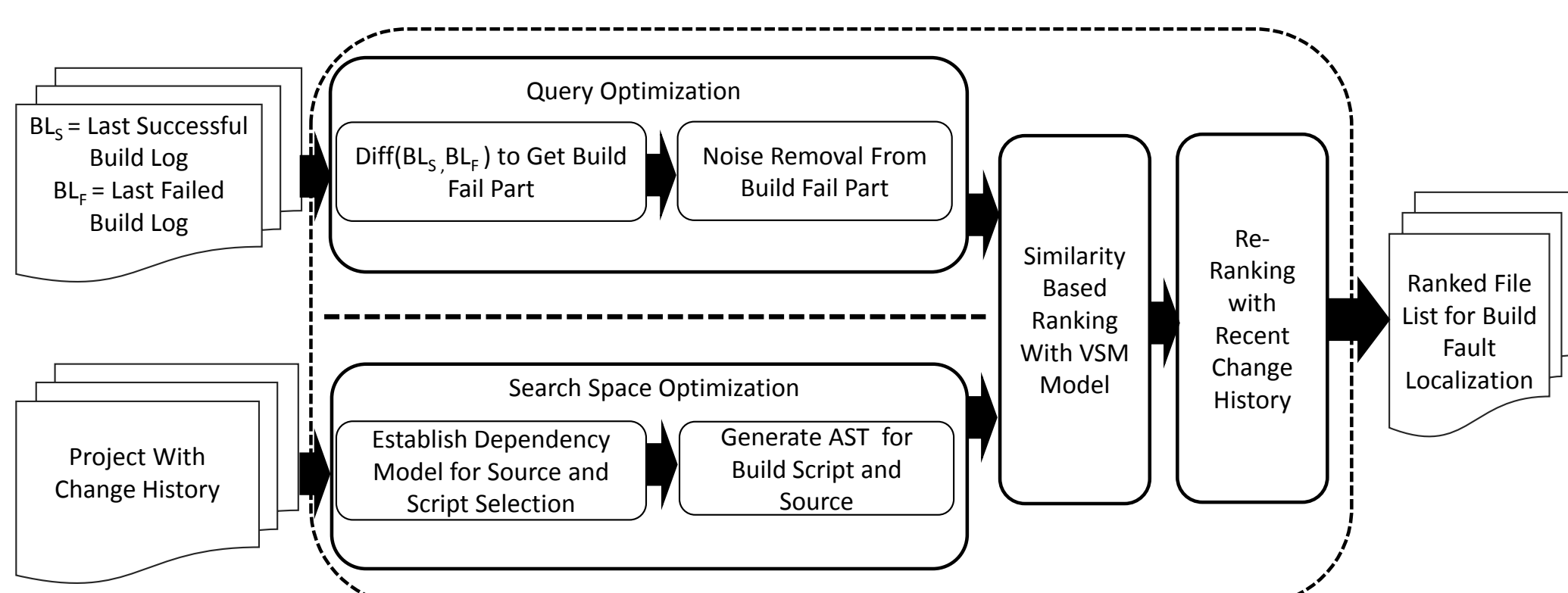


Overview of History-Driven Repair of Build Scripts.



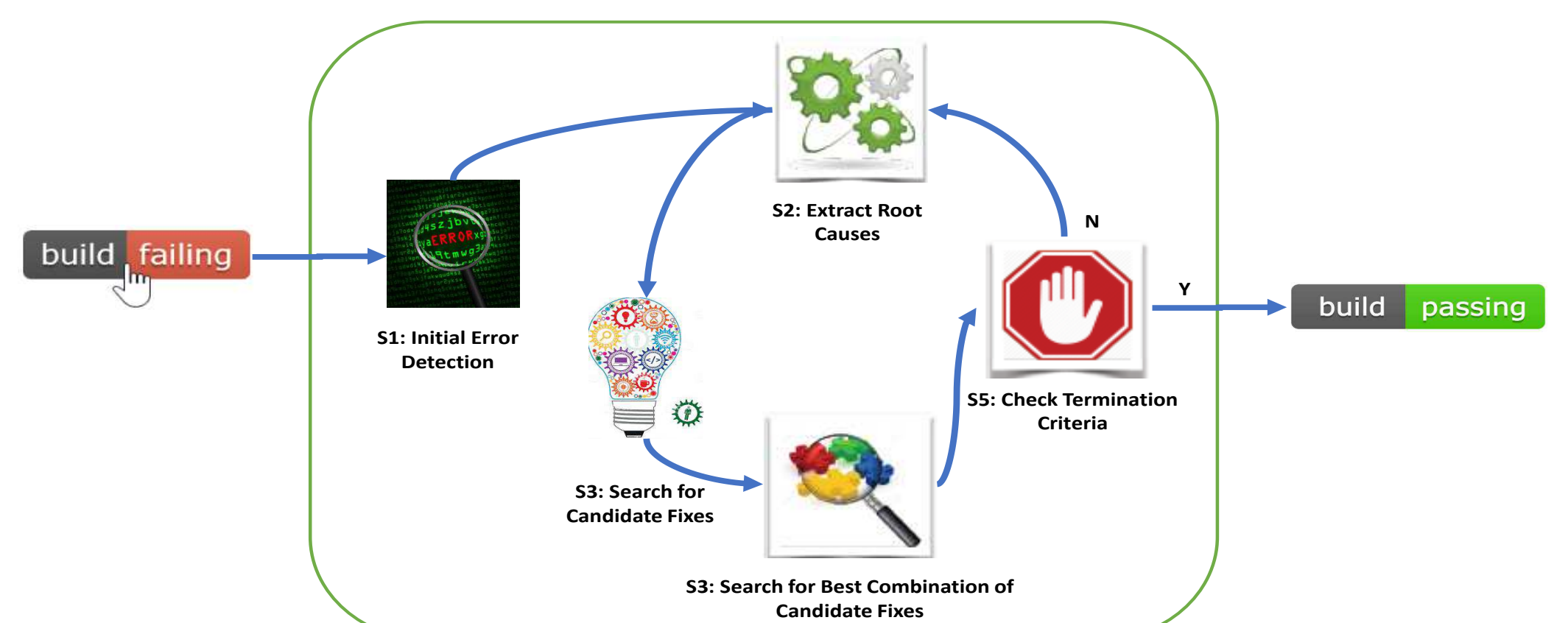
- 11 of 24 Reproducible Build Failures Can Be Fixed Successfully 45.83%.
- Manually Checked All The Automatically Generated Fixes Are Semantically Equivalent to Manual Fixes.

FAULT LOCALIZATION IN CI (ONGOING)



- Build Failures may be triggered by faults in source code and/or build scripts, while current approaches consider only build scripts.
- A unified technique to localize faults in both source code and build scripts in CI Environment.

UNIFIED REPAIR TOOL (PLANNED)



- With the proposed fault localization technique, identify failure types and location of build failures.
- Program repair techniques with unified fault localization can be applied to repair build failures with build script and source code.