

Impact Analysis in the Presence of Dependence Clusters Using Static Execute After in WebKit

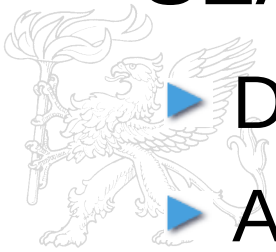


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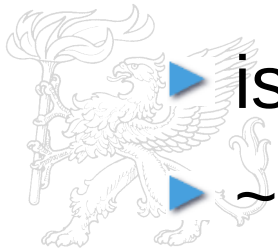
Overview

- Motivation
- Static Execute After (SEA)
 - ▶ Definition
 - ▶ Impact analysis in WebKit
- SEA-based dependence clusters
 - ▶ Dependence clusters in WebKit
 - ▶ Application to regression test selection
- Summary and future plans



Motivation

- Change propagation in large systems
 - ▶ Indirect effects of changes are often neglected
 - ▶ Slicing is too expensive
 - ▶ Static Execute After may be applicable
- WebKit
 - ▶ is a large, actively developed system
 - ▶ ~90000 procedures, frequent commits
 - ▶ ~30000 regression test cases



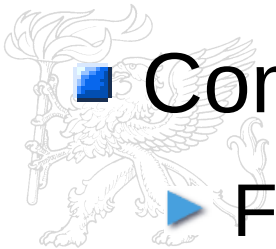
Static Execute After (SEA)

■ Definition

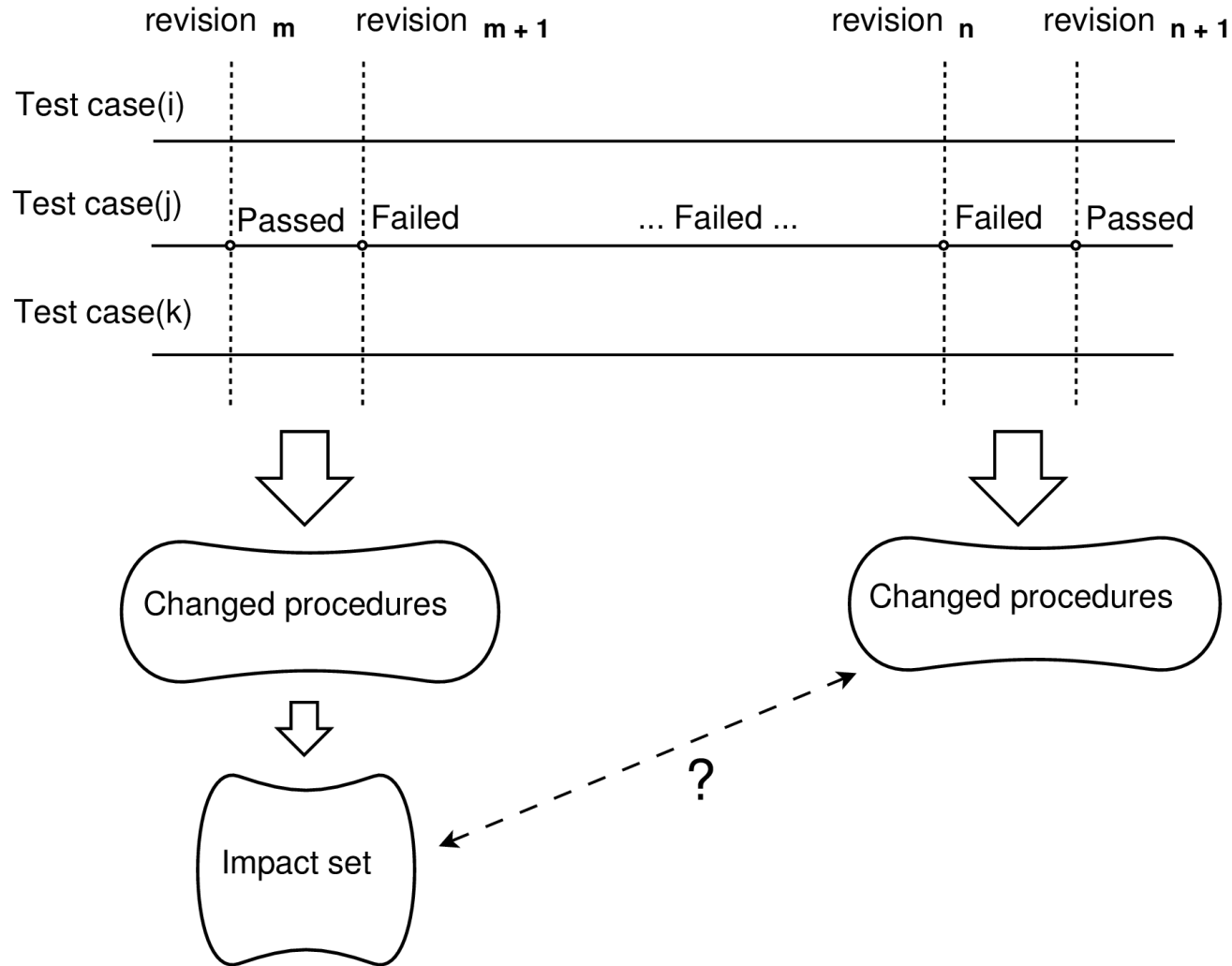
- ▶ Relation on procedures of a program
- ▶ Control flow based
- ▶ $P \rightarrow Q$ iff
part of P may be executed before a part of Q is executed

■ Compared to slicing

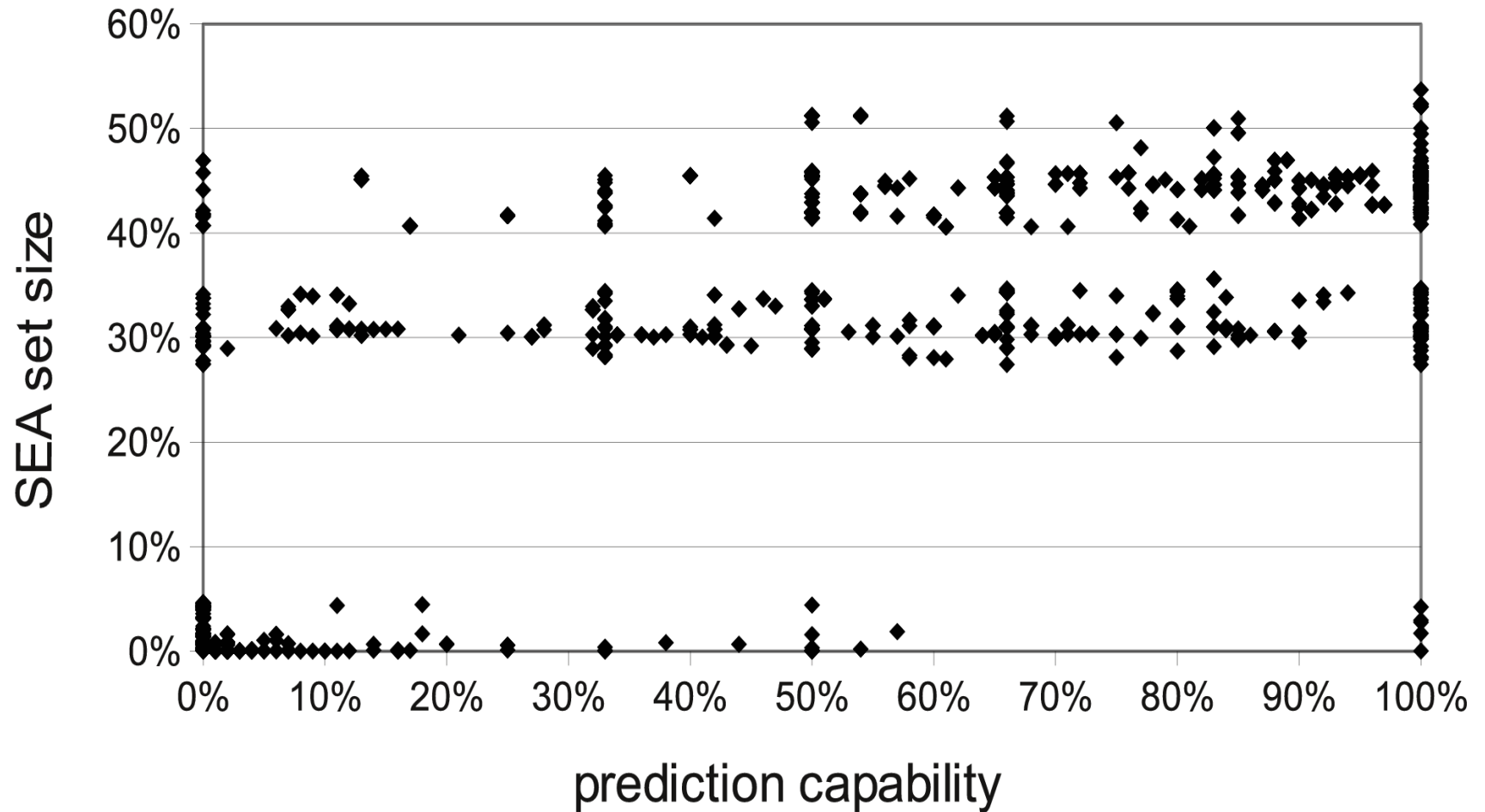
- ▶ Faster to compute
- ▶ Slightly less precise
- ▶ May be suitable for large systems



Impact analysis in WebKit

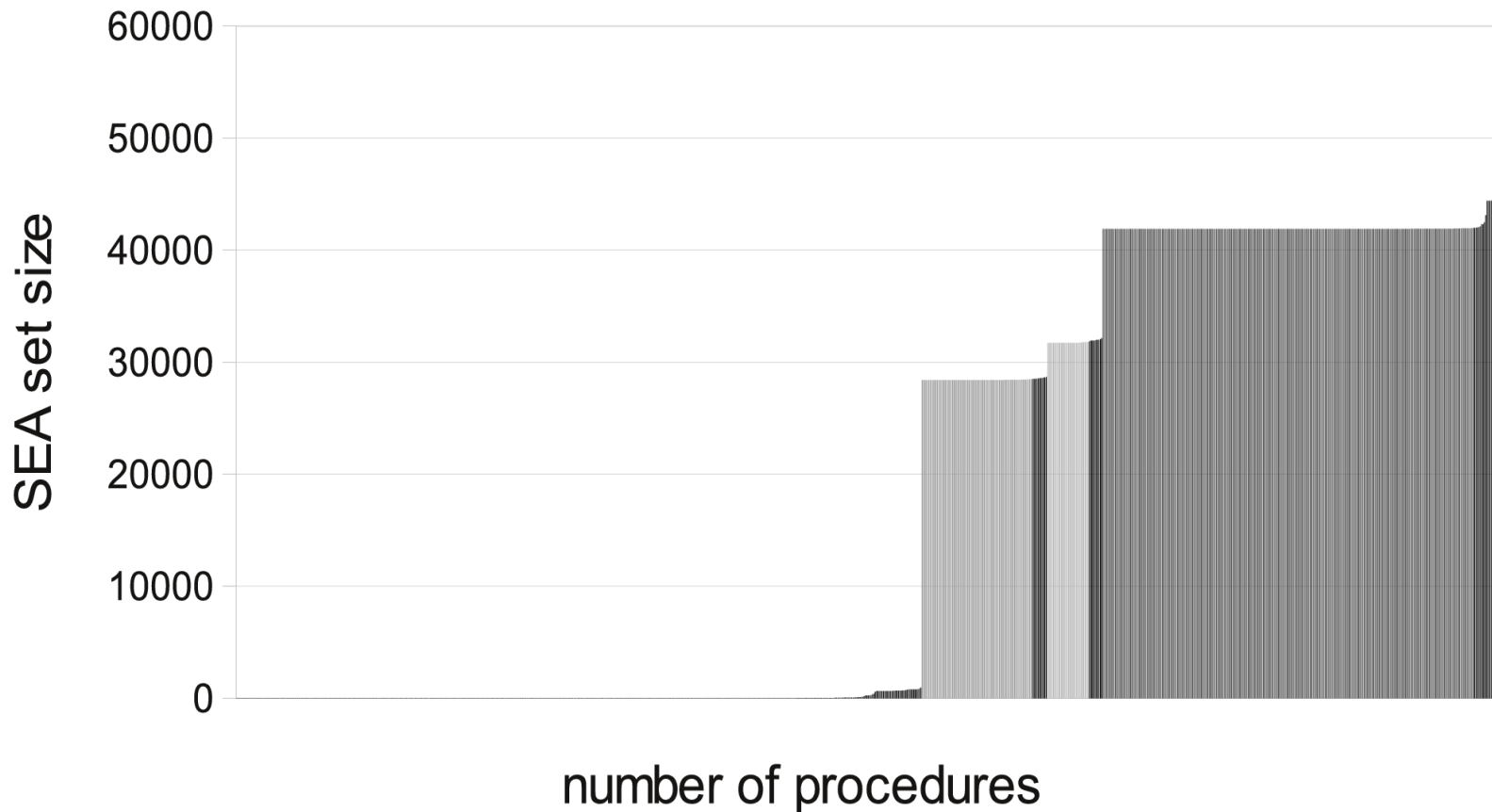


SEA prediction capability



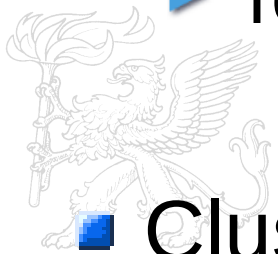
SEA dependence clusters in WebKit

- Monotone Size Graph (MSG*) applied to SEA



Regression test selection in WebKit

- Large regression test suite (~30000 test cases)
 - ▶ Full execution is expensive
 - ▶ Test prioritization using test case coverage frequencies
 - ▶ Test selection based on assigned priorities
- Cluster information can be used to improve inclusiveness (failed test cases found)



Summary and future plans

- Information about dependence clusters helped
 - ▶ in assessing gains from impact analysis
 - ▶ in improving test selection methods (WebKit EWS)

- What can we do about large clusters?

- ▶ Eliminate

- Detection → removal

- ▶ Avoid

- Tool support to give early warning to programmers
 - Can we advise best practices/design patterns?
 - What language features should be changed (eliminated)?

