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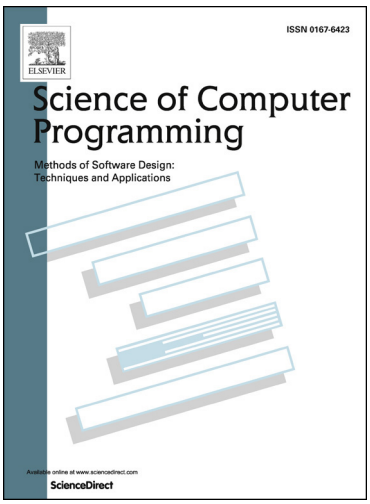

A framework for defining coupling metrics

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A Framework for Defining Coupling Metrics

Ewan Tempero and Paul Ralph

Abstract

Many metrics have been proposed to measure coupling—the degree of association between modules in a system. They have often been described in different ways, hindering comparison and research. Their definitions are often incomplete regarding language features in some languages, meaning different tool developers may implement the same metric differently. This complicates comparing results from studies that use different tools. This paper therefore aims to define coupling metrics consistently and unambiguously.

The paper describes a model of coupling that uses the reification of the concept of *dependency* as its fundamental unit. Based on this model, it defines a framework for defining coupling metrics. It shows how to define several well-known coupling metrics in the framework, and how defining different metrics based on the same model facilitates direct comparisons. It discusses how the framework resolves issues due to incomplete metric definitions, such as different language features. This formal framework is sufficiently simple that it can be implemented in such a way as to provide multiple metrics.

1 Introduction

Coupling—the degree to which different parts of a system are interconnected [24]—has been proposed as an attribute of software and dimension of software design quality. The more parts are connected, the more difficult it is to understand each part in isolation, change one part without breaking others, or use a part in a new context. The relationship between coupling and design quality motivates researchers and professionals to measure coupling and, with