Detecting Heartbeat Architectural Tactic in Source Code Using Program Analysis

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Abstract : Architectural tactics such as heartbeat, ping-echo, encapsulate, encrypt data are techniques that are used to achieve quality attributes of a system. Detecting architectural tactics has several benefits: it can aid system comprehension (e.g., legacy systems) and in the estimation of quality attributes such as safety, security, maintainability, etc. Architectural tactics are typically spread over the source code and are implicit. For large codebases, manual detection is often not feasible. Therefore, there is a need for automated methods of detection of architectural tactics. This paper presents a formalization of the heartbeat architectural tactic and a program analytic approach to detect this tactic in source code. The experiment of the proposed method is done on a set of Java applications. The outcome of the experiment strongly suggests that the method compares well with a manual approach in terms of its sensitivity and specificity, and far supersedes a manual exercise in terms of its scalability.