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Improving the Security of UML Sequence Diagram Using Genetic Algorithm

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ABSTRACT A sequence diagram is a modeling approach for visualizing the behavioral execution of a system. The objective of this research is to investigate the problem of security in a behavioral model (sequence diagram) through the application of model refactoring. We propose detection and correction techniques, empirical evaluation of the proposed techniques and assessment of security improvement in sequence diagrams. The detection of security bad smells is achieved through the adaptation of a genetic algorithm, while correction is accomplished by the model transformation approach. The results show significant detection recall and correction efficacy of the proposed detection and correction approaches, respectively. Our results show that the proposed approach is effective in detecting and correcting bad smells and can improve the security of UML Sequence Diagram.

INDEX TERMS Software security, security bad smells, software refactoring, genetic algorithm, software metrics.