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An Empirical Evaluation of a Model-Based Test Data Generation Framework for Reducing System Integration Delays

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Abstract: *Modern software engineering has introduced a manual bottleneck in the setup of test data that slows down the Continuous Integration and Continuous Delivery (CI/CD) cycles, hence long integration cycles with the system and increased risks on quality. This paper empirically evaluates a novel Python-based model-driven framework designed to automatically generate complex relational state-aware test data. Parsing declarative models of data entities and their constraints will help us develop an approach to automatically create valid and semantically appropriate test datasets for large-scale enterprise projects from the financial and healthcare domains within their CI/CD pipelines. Changes in some of the key metrics were analyzed by way of a longitudinal case study, i.e., before and after implementation. It takes only 15 minutes compared to 8 hours earlier, leading to a reduction of 97% in time spent setting up the test environment. Also, by keeping data safe and ready, the plan helped cut down on 60% of production flaws tied to data problems. This fix made it possible to fully automate after-deployment checks and greatly improved the test range.*

Keywords*:* Model-Based Testing, Test Data Generation, Continuous Integration, Continuous Delivery, CI/CD, DevOps, Software Quality, Automation

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