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An Approach for Development of Reusable Function Library for Automation of Continuous Processes

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Abstract

The paper introduce to challenges in automation of continuous processes in companies with many active software development projects. Usually companies have automation solutions for particular projects. When new software development projects are coming, companies would like to save up resources and efforts needed for automation solutions in these projects. In case when automation solutions, implemented in existing projects, are reusable, they could be used in new project without additional efforts for refactoring, development automation solution from scratch etc. Current paper provides an approach for development of library of reusable functions. This library allows reusing implemented automation functions in the different projects and in the different workflows. Finally, a prototype is developed for practical experiments. Based on its results, benefits, disadvantages and improvement directions of provided approach are detected.

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1. Introduction

The paper provides an approach for development of reusable functions library. The library contains scripts for automation of different IT operations, what is mandatory requirement to support different continuous services. New approach allows developing reusable scripts, which are easy managed. Reusable scripts allows to automate IT operations for continuous processes for 70% – 80% faster when automation without reusable scripts.

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The study provides brief background and introduction to previous researches. New approach for development of reusable function library introduced, as well, example is given. The last section of current paper introduces prototype. The prototype is implementation of provided approach, which was an instrument to make practical experiments and testing of new approach. Finally, results of experiments introduced and further research directions defined.

2. Research background

Current research has been started few years ago. Then only software configuration management have been included in research topic. Firstly, during reading the books about best practices of software configuration management^{1,2}, interesting problem have been detected. Sometimes ready solution for automation of process of software configuration management is not in consequence with initial requirements of mentioned process. It means that purpose of some requirements have been lose during development of source code for automation.

Authors of mentioned books^{1,2} introduce to using models for initial requirements of process, for example, branching models, models of software builds and deployment process etc. After source code for automation of mentioned processes is ready, it should be checked for a consequence with models of requirements. It was one of the first attempts to use model-driven ideas in the field of software configuration management. Later, new ideas to use model-driven approach for software configuration management and automation of related processes are provided^{3,4}. There are some benefits using model-driven approach in the automation field:

- Generating source code for automation by model-driven approach could reduce manual efforts and save up time during development of code
- Increase traceability between initial requirements and source code

Later, ideas to use model-driven approach have been provided in few papers related to software configuration management^{5,6,7}. Until year 2009, software configuration management and automation of related processes have been studied together with build and deployment management, integration with bug tracking, continuous integration etc. All these processes have been designated as IT operations, but huge methodology and research topic related to automation and improvement of mentioned operations have called DevOps^{8,9}. One of the main challenges of DevOps approach was statement that speed of IT operations should be quite high to get in time working software to customer during high level of agility^{10,9}.

Nowadays many tools are related to automate IT operations and most of them use model-driven approach as base idea⁸. As an example, OpenMake tools could be mentioned. One of authors of OpenMake tools, Tracy Ragan⁹ told that novel solutions for automation of IT operations have not exist without model-driven approach, because static scripts could not be successfully applied in a cloud, where is no information about static addresses of servers or about platforms. During research, described in current paper, a number of tools and approaches related to automation have been studied. There are some disadvantages of mentioned tools:

- Sometimes, the scope of tools is only one particular IT operation, for example building and deployment. There are no recommendations how to integrate these tools with other tools related to automate other operations
- Some tools requires buying licences, installing a number of additional tools and refactoring a structure of existing projects. It could be a problem for managers of companies, because usually companies already have a number of trusted tools, script and best practices. Companies would like to increase reuse of existing and trusted tools and scripts, instead of buy new unknown and untrusted tools

As a result, authors of current paper also taken model-driven approach as main idea of new solution for automation. However, provided solution is not limited to using particular tools or automation of only some particular operations. Provided solution allows developing a library with reusable units of source code for automation of different operations. The library allows adding new units and allows working with existing and trusted tools and

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