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# An Empirical Study of Architecting and Organizing for DevOps

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# Abstract

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## **An Empirical Study of Architecting and Organizing for DevOps**

by Mojtaba Shahin

Attracted by increasing the need of being able to improve business competitiveness and performance, many organizations have started to optimize themselves to develop and deliver high-quality values more quickly and reliably. Development and Operations (DevOps) is emerging as a promising approach in the software industry to help organizations to realize this goal. However, establishing DevOps practices, specifically continuous delivery and continuous deployment practices, in the industry is a challenge as it requires new organizational capabilities and novel techniques, methods and tools for application design, testing and deployment.

Most research on DevOps focuses on tooling support, improving automation in testing and deployment, improving performance and integrating security into the deployment process to initiate and implement DevOps. To date, little is known about the impact of continuous delivery and deployment as two main DevOps practices on organizational structure (i.e., team structure) and the architecture of a system, those that are supposed to be fundamental limitations to adopt these practices.

This thesis aims at filling this gap by conducting a set of empirical studies. We first design and conduct a systematic literature review to gain a comprehensive understanding of the concept of continuous delivery and deployment and the current state of research in this regard. Second, we design, implement and analyze a large-scale mixed-methods empirical study, consisting of 21 interviews and 98 survey responses. Finally, we conduct an in-depth industrial case study with two teams in a case company to explore the role of software architecture in DevOps transition. The empirical studies contribute to (1) provide detailed insights into the specifics of challenges moving from continuous delivery to continuous deployment; (2) find how teams are organized in software industry for adopting continuous delivery and deployment; and (3) develop evidence-based guidelines on how to (re-) architect an application to enable and support continuous delivery and deployment.

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## Declaration

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I, **Mojtaba Shahin**, certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

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Date: 2/08/2018

Signature

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2/08/2018

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# Dedication

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*To my family*