Evidence-Based DevOps for Continuous Collaboration, Process, and Delivery

Emerging technologies such as Cloud computing and microservices allow software developers and IT professionals to have effective interactions within and across development, quality assurance, and operation teams. These brought a new paradigm called DevOps = Development + Operations to both software developers and IT professionals. DevOps is not about tools, but "*culture that extends far beyond the cubicles of developers and operators*" [1]. DevOps is an extension of an agile development based upon a slogan "*People over Process over Tools*" [2]. Because of that, DevOps truly value continuous collaboration, continuous process, and continuous delivery [2, 3]. However, there are no explanation of how DevOps participants can conduct DevOps to reengineer a given legacy software system to a DevOps-aware target software system.

The purpose of this research is to propose a new approach called Evidence-Based DevOps and to demonstrate how we can reengineer a given legacy software system to a DevOps-aware target software system that will support continuous collaboration process, and delivery. For this purpose, we borrow an approach from medicine, Evidence-Based Medicine (EBM). In EBM, healthcare service providers use Evidence-Based Practice (EBP) to take care their patient effectively [4, 5]. EBP is a best practice underpinned by scientific research evidence with consideration of values and circumstances of an individual patient. To conduct clinical practices, a healthcare service provider uses AAAAP: Assess your patience's value and circumstance, Ask their preference and circumstance, Acquire scientific evidences, Appraise best practices, and Practice the chosen evidence-based practices [5]. In Evidence-Based DevOps, we apply EBP to DevOps by using the AAAAP approach. We first **assess** the given legacy application to improve the values of DevOps. Second, we **ask** questions to DevOps teams of development, quality assurance, and operation in terms of the values of DevOps. Third, we **acquire** scientific research evidences in Software Engineering, Information Technology, Cybersecurity, etc. Fourth, we **appraise** best practices that the scientific research evidences support. Last, we **practice** the chosen best practices to reengineer the legacy system to a target system. As a case study, we demonstrate how we can reengineer even a simple application by using Evidence-Based DevOps. We also show that we significantly upgrade its architecture during Evidence-Based DevOps such that we can support the values of DevOps – Continuous Collaboration, Continuous Process, and Continuous Deployment.

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