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IEEE Standard for DevOps: Building Reliable and Secure Systems Including Application Build, Package, and Deployment

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IEEE Computer Society

Developed by the
Software & Systems Engineering Standards Committee

IEEE Std 2675™-2021

IEEE

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Abstract: Technical principles and processes to build, package, and deploy systems and applications in a reliable and secure way are specified. Establishing effective compliance and information technology (IT) controls is the focus. DevOps principles presented include mission first, customer focus, left-shift, continuous everything, and systems thinking. How stakeholders, including developers and operations staff, can collaborate and communicate effectively is described. The process outcomes and activities herein are aligned with the process model specified in ISO/IEC/IEEE 12207:2017 and ISO/IEC/IEEE 15288:2015.

Keywords: agile, continuous delivery, continuous deployment, continuous integration, DevOps, IEEE 2675™, left-shift

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Introduction

This introduction is not part of IEEE Std 2675™-2021, IEEE Standard for DevOps: Building Reliable and Secure Systems Including Application Build, Package, and Deployment.

The complexity of software systems has increased to an unprecedented level. This has led to new opportunities, but also to increased challenges for the organizations that create and utilize systems. One of the greatest challenges has been to address the increased rate of change in modern development methodologies, including agile and even rapid iterative development. These challenges exist throughout the life cycle of a system and at all levels of architectural detail. This document highlights the manner in which DevOps can help address the challenges inherent in accelerated development methodologies and achieve end user goals for increased productivity and quality.

DevOps is an interdisciplinary approach and means to enable the realization of successful software systems. It focuses on defining stakeholder needs and required functionality early in the development cycle, documenting requirements, and performing design synthesis and system validation while considering the complete problem. It integrates the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation and maintenance. It considers both the business and the technical needs of stakeholders with the goal of providing a quality product that meets the needs of users and other applicable stakeholders. This life cycle spans the conception of ideas through to the retirement of a system. It provides the processes for acquiring and supplying systems. It helps improve communication and cooperation among the parties that create, utilize, and manage modern software systems. In addition, this framework provides for the assessment and improvement of the life cycle processes.

This document is appropriate both for organizations that are unused to applying engineering process standards, and for those who have used longstanding standards, who have the goal of implementing effective information technology (IT) controls, embracing and managing risk, while enabling more rapid development (higher velocity). Organizations that are already embracing IEEE standards can find IEEE Std 2675 to be essential in helping them to implement the DevOps transformation. Organizations that choose IEEE Std 2675 as their first industry standard can subsequently apply a broader family of IEEE standards.

This document is closely aligned with the life cycle processes in ISO/IEC/IEEE 12207:2017 [B14][1] and ISO/IEC/IEEE 15288:2015. Configuration management is the basis of DevOps and hence it is also closely aligned with IEEE Std 828™ [B3], along with other related standards.

[1] The numbers in brackets correspond to those of the bibliography in Annex A.

Contents

IEEE Standard for DevOps: Building Reliable and Secure Systems Including Application Build, Package, and Deployment

1. Overview

1.1 Scope

This document provides requirements and guidance on the implementation of DevOps to define, control, and improve software life cycle processes. It applies within an organization or a project to build, package, and deploy software and systems in a secure and reliable way. This document specifies practices to collaborate and communicate effectively in groups including development, operations, and other key stakeholders.

This document applies a common framework for software life cycle processes, with well-defined terminology. It contains processes, activities, and tasks that are to be applied to the full life cycle of software systems, products, and services, including conception, development, production, utilization, support, and retirement. It also applies to the acquisition and supply of software systems, whether performed internally or externally to an organization. These life cycle processes are accomplished through the involvement of stakeholders, with the ultimate goal of achieving customer satisfaction. The life cycle processes of this document can be applied concurrently, iteratively, and recursively to a software system and incrementally to its elements.

This document applies to software systems, products, and services, and the software portion of any system. Software includes the software portion of firmware. Those aspects of system definition needed to provide the context for software systems, products, and services are included.

There is a wide variety of software systems in terms of their purpose, domain of application, complexity, size, novelty, adaptability, quantities, locations, life spans, and evolution. This document describes the processes that comprise the life cycle of software systems. It therefore applies to one-of-a-kind software systems, software systems for wide commercial or public distribution, and customized, adaptable software systems. It also applies to a complete stand-alone software system and to software systems that are embedded and integrated into larger, more complex, and complete systems.