



Master's Thesis:

Automatic configuration generation and management of SIL 2 Software for TCMS

Background

Engineering of safety critical systems is a complex problem mainly due to the complex nature of the systems and the demand of high reliability, integrity and safety. Industries engineering such systems require to certify and/or show compliance with the generic and domain specific standards to ensure the safety of their product. For example, in railway domain, the on-board software is required to show compliance with standards such as EN 50657 and EN 50129. Train Control and monitoring System (TCMS) is one such on-board software system, which is responsible of the vehicle and train control, on board communication between all sub-systems, system diagnostic for preventive & corrective maintenance, process visualization, train to way side communication and passenger information & entertainment functions.

Incorporation of recent software engineering approaches into the development of such software systems may result in mastering the complexity and adding business value. For example, continuous development activities such as continuous integration, delivery and deployment not only shortens the development life cycle but also enable early feedback on the delivered software. Such early feedback incorporated in the next version of the release contributes in increased quality and customer satisfaction, henceforth. Enabling such continuous development demands automation of the activities involved in different stages of the development pipeline such as integration and deployment etc. In this work the focus is to automate the management of different configurations of the software to reduce the complexity, shorten the feedback loop and to get a step closer to enabling continuous integration. However, this automation shall be systematic and driven by the non-functional attributes to preserve the reliability, integrity and safety attributes of the delivered software.

Objective

The project will consist of the following tasks:

1. Literature review to identify the state of art
2. Proposing an approach for automating the management of configurations.
3. Implementation and evaluation of the approach on TCMS use case.

Application

Prerequisites: Enrolled in Master's in Software Engineering/Embedded Systems/Computer Science and/or other related education. Understanding of version control systems (such as GIT/SVN), Programming in C/C++ and knowledge of scripting. Knowledge of continuous integration/deployment approaches is a plus.

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