Master Thesis – Automated Test Equipment Utilization Measurements and Usage Optimization

Description
Today’s software development practice uses more and more the concept of Continuous Integration (CI). Continuous integration is the practice, in software engineering, of merging all developer working copies with a shared mainline several times a day.

The practice includes the concept of running automated test to ensure quality and find problems as early as possible. The automated test suites quite often have a large set of test cases that are run for each integration of software changes. In many cases these test cases are run on target platforms consisting of real product hardware in a network with traffic generators and other external test equipment of different kind.

A challenge for all organizations that uses CI and automated test cases is to shorten the test time for a quick verdict of the integration activity (successful or not), and at the same time balance the investment of hardware resources and test equipment. More hardware resource and test equipment allow for more parallel testing with shorter test time as result, but increase the cost for the organization and the development of software.

The main purpose of the this thesis is to analyze our current ways of working when it comes to software development and continuous integration, develop necessary tools to identify our current key hardware resource utilization level, and bottlenecks, and propose improvements and new ways of working based on technology choices, process and methods improvement etc. It also includes prototyping potential technical solutions that could increase the utilization efficiency using our test framework as base.

Task
The thesis work is divided into several steps and areas with the end goal of concrete improvement proposals and potential prototypes to show case the benefits of the proposed improvements.

The following steps are envisioned as part of the thesis work:
- Analyze current situation through observation, interviews and participation in daily operations for an understanding of current ways of working.
- Develop necessary tools to be able to measure where current bottlenecks in hardware resources are. The tools could be used to monitor the utilization of the hardware resources used by software development and CI to visual identify where the scares resources in the process are.
- After identifying the current scares resources, and bottlenecks, investigate technology and process solutions to increase the utilization efficiency of the hardware resources and propose improvement to the organization.
- If possible prototype any technical solutions proposed to increase efficiency rate, and measure the improvement achieved.
This thesis contains both analytic parts, to understand current ways of working, as well as the opportunity to apply state of the art technology to improve the efficiency. It also requires creativity in coming up with new ideas how our test frameworks (developed in Java based on JUnit and TestNG) could better utilize the scarce resources as well as developing necessary tools that could measure the utilization level of all key hardware equipment in the development lab.

Qualifications
This project aims at Master of Science (Civilingenjör) students, preferably having a background in software, computer science and/or communication and networking.

Extent: 1 student, 30 hp
Apply before: 2013-12-31
Preferred starting date: Spring 2014

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