Brno University of Technology - Faculty of Information Technology

Department of Intelligent Systems

Academic year 2016/2017

Master's Thesis Specification

For: **Ťulák Jan, Bc.**

Branch of study: Mathematical Methods in Information Technology

Title: **Refactoring and Verification of the Code of mkfs xfs**

Category: Software analysis and testing

Instructions for project work:

1. Get acquainted with the xfs journalling file system and with the code of mkfs xfs.
2. Study code analysis and verification techniques applicable on the code of mkfs xfs, including both light-weight approaches (e.g., searching for error patterns) as well as heavy-weight approaches (model checking).
3. Propose and implement a refactoring of the code of mkfs xfs with the aim of enhancing its maintainability and testability.
4. Propose a combination of light-weight and heavy-weight techniques suitable for analysis and verification of the refactored code of mkfs xfs and apply it on the code.
5. Discuss the obtained results and propose possible future improvements of your work.

Basic references:

- WiKi pages of project XFS, http://xfs.org/index.php/Main_Page.
- Křena, B., Vojnar, T.: Automated Formal Analysis and Verification: An Overview, In: International Journal of General Systems, 42(4):335-365, Taylor and Francis, 2013.
- Beyer, D., Erkan Keremoglu, M.: CPAchecker: A Tool for Configurable Software Verification, In: Proc. of CAV'11, LNCS 6806, Springer-Verlag, 2011.

Requirements for the semestral defense:

First two items plus at least some initial proposal of how to proceed with items 3 and 4.

Detailed formal specifications can be found at http://www.fit.vutbr.cz/info/szz/

The Master's Thesis must define its purpose, describe a current state of the art, introduce the theoretical and technical background relevant to the problems solved, and specify what parts have been used from earlier projects or have been taken over from other sources.

Each student will hand-in printed as well as electronic versions of the technical report, an electronic version of the complete program documentation, program source files, and a functional hardware prototype sample if desired. The information in electronic form will be stored on a standard non-rewritable medium (CD-R, DVD-R, etc.) in formats common at the FIT. In order to allow regular handling, the medium will be securely attached to the printed report.

Supervisor: **Vojnar Tomáš, prof. Ing., Ph.D.**, DITS FIT BUT

Beginning of work: November 1, 2016

Date of delivery: May 24, 2017

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