

Report from Slovak University of Technology

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In the year 2010, Slovak University of Technology in Bratislava awarded 138 Master's degrees in fields within Information Sciences and Technologies, studying at its Faculty of Informatics and Information Technologies. This Faculty offers 3 study programmes. In Computer and Communication Systems and Networks, there were 59 graduates. In Information Systems, there were 35 graduates. In Software Engineering, there were 66 graduates.

The Faculty evaluates the cohort of its graduates each year, taking into account their study results but most importantly the quality of their theses. According to their overall study results, the top 1-2% receives Summa Cum Laude, the next 3% receives Magna Cum Laude and the next 6% receives Cum Laude (limits are approximate). Based on their thesis reviews, presentation and defence, approximately 5% receives Award for Excellent Thesis. The Faculty aims at distinguishing itself by a strong research dimension. This is reflected also in Master's theses, which are expected to make contributions to some research problem related to the field of study of the particular student.

In 2010, 1 graduate received Magna Cum Laude and 8 graduates received Cum Laude. In the following there are listed abstracts of theses that were evaluated as the 8 top ones (roughly 5%) from all the theses (138) submitted in 2010. Also, there are listed titles of other 21 theses that received Honourable Mention.

Dean's Award for Excellent Master Thesis

Student: Michal Holub

Degree program: Software Engineering

Thesis title: Adaptation of Website's Navigation Based on Behavior of Users

Supervisor: Mária Bieliková, Professor

Annotation: We deal with proposing a method for personalization of website's navigation. With personalized navigation the user should get the right information without the need for explicitly asking for it. The main contribution of our proposed method is automatic adaptation of showed links based on the monitoring of user's behaviour during his visit of the website. Another novel feature is automatic estimation of user's interest in visited web page. We use proposed approach to recommend interesting links among similarly behaving users. The recommended links are presented in a form of personalized calendar and personalized news sections. We evaluate our method in experiments with adaptation of the structure of our web faculty portal.

Student: Stanislav Ochotnický

Degree program: Software Engineering

Thesis title: Synthesis of VHDL from SIMULINK Model

Supervisor: Juraj Štefanovič, PhD.

Annotation: The aim of this thesis is to introduce a new tool for speeding up development of specialized embedded systems with high performance and reliability based on the FPGA technology. The Tool developed by us enables synthesis of the VHDL

from a model created in the Mathworks Simulink. The theoretical introduction contains information about embedded systems, the FPGA technology and the Simulink environment. We also contemplate different tools for the FPGA synthesis from high-level languages. The implemented tool was tested and regarded as functional and fulfilling requirements. In the end we propose possible further improvements and extensions of this tool.

Student: Michal Olšovský

Degree program: Computer Systems and Networks

Thesis title: TCP Protocol Performance

Supervisor: Margaréta Kotočová, Assoc. Professor

Annotation: We provide an overview of current performance of the TCP protocol in various network environments from the point of the delay and bandwidth. The work includes an analysis with the presentation of the TCP protocol from the OSI model to its high speed variants with an emphasis on the elements affecting the protocol's performance. An example is TCP header with added extensions, congestion management, window's management, or different variants of the TCP protocol. We provide an overview of the most commonly used network simulators used to simulate the performance of each TCP option. The practical part is dedicated to the specification, design, implementation and testing of following extensions – window scaling, window scaling with the cancel option, window scaling with the resume option and extended window scaling.

Student: Jakub Šimko

Degree program: Software Engineering

Thesis title: Enhancing Search Using Graphs and User Model

Supervisor: Michal Tvarožek

Annotation: Our aim is to enrich the exploratory search domain by designing, implementing and validating new methods, that use graph and graphic visual structures and deducting knowledge about users. This document introduces to the realm of web search and exploratory search, its problematic aspects and analyzes several solutions in this field. Exploratory search includes support of open-ended search tasks and relies on visualization of information space. Afterwards, design, implementation and validation description of our new methods follows. Within the scope of exploratory search, we employ ourselves by clarifying the process of search by visualization of its history and conceptualizing and sorting of user's results. We also design a support method for creating term networks by analyzing the logs of simple game with web search engine that employs negative search.

Slovak Academy of Sciences Award for Excellent Master Thesis

Student: Pavol Bača

Degree program: Software Engineering

Thesis title: Replacing Object-Oriented Patterns with Intrinsic Aspect-Oriented Patterns

Supervisor: Valentino Vranić, PhD.

Annotation: We analyse possibilities of replacing object-oriented patterns by advantageous aspect-oriented patterns instead of reimplementations. Aspect-oriented design patterns are also compared with patterns in Christopher Alexander's understanding. We also analyse the way of replacement of four object-oriented patterns by Cuckoo's Egg and Worker Object Creation patterns. The term 'replacement' is discussed here in relation to Director pattern. By using these four replacements a few of pattern composition examples have been made. The examples also partially confirm these replacements. Quantitative assessments of the examples have been made. In the results, the replacements seem to be better from the perspective of separation concerns and coupling. On the other hand, some restrictions have shown which make the replacements not be better in all cases.

Student: Tomáš Kramár

Degree program: Software Engineering

Thesis title: Supporting User Navigation Using Social Network Context

Supervisor: Michal Barla

Annotation: Current search engines treat user queries in isolation. User goals, interests and needs, i.e. his context are completely ignored. To solve this problem, we employ a simple fact that similar users tend to have similar needs and browse similar Web pages. In this work we present a method to add search to context by leveraging the structure of the underlying social network. The proposed method was experimentally evaluated on the adaptive proxy server platform, where we modified the search results to include the recommended results. These recommendation were successful in 22% of all cases (user clicked some of the recommended links). Moreover, the users were more interested in the recommended results than in the regular results; users spent more than 4 seconds on the recommended page in 54,7% of all cases, compared to 27,4% for regular search results.

Student: Michal Kompan

Degree program: Software Engineering

Thesis title: Personalized Recommendation of Interesting Texts

Supervisor: Mária Bieliková, Professor

Annotation: We present an analysis of existing solutions and systems, which cover topic of personalized recommendation of news articles. The result of our work is proposal of the novel method for personalized recommendation based on the article content. We focused on fast content similarity search, and on short and fast article representation, which can be used for real-time recommendation. The article representation is based on multicomponent article vector, which represents the article based on article title, correlation between article title and content, article category, several keywords or readability index. This kind of representation allows us to represent non text articles too (e.g., video or photo content). Proposed methods were verified in the domain of news portal SME.SK.

Student: Ján Turoň

Degree program: Computer Systems and Networks

Thesis title: Visualization of SystemC Model Simulation

Supervisor: Katarína Jelemenská, PhD.

Annotation: We concern on simulation of digital systems described using SystemC library and simulation results presentation. We analyze available simulators and tools for schematic representation of SystemC designs and propose to extend existing tool SystemC+Visualizer by reactivating the built-in but previously not used OSCI simulator. New data structure that records all simulation data and routine for loading and presentation of its contents is proposed and implemented. Our applica-

tion creates block diagram of digital system and allows its simulation. Ports and wires are colored according to their current logic value, which is also shown as a number. The new product implemented as a static library is suitable for students as educating support tool, as well as for visual debugging of SystemC models in general.

Dean's Honourable Mention For Master Thesis

Balažia, Ján: *Ethernet II Based Routing Using Helping Protocol*. Supervisor: B. Dado

Hrubý, Martin: *QoS in MPLS Networks*. Supervisor: M. Kotočová

Koine, Peter: *Interactive Presentation System*. Supervisor: K. Jelemenská

Marko, Peter: *Security Analysis of Network Protocols*. Supervisor: L. Hudec

Martinský, Ladislav: *Personalized Web Search Query Suggestion*. Supervisor: P. Návrat

Michalec, Vladimír: *Application for Filtering Users' Access to Web Pages*. Supervisor: I. Grellneth

Michlík, Pavel: *Navigation and Search on Adaptive Social Web*. Supervisor: M. Bieliková

Nagy, Ladislav: *Evolutionary Optimization of the Busy Beaver Problem*. Supervisor: J. Pospíchal

Polák, Marek: *Forms of Interaction in Virtual Reality Usable in the Process of Education*. Supervisor: A. Kovárová

Rada, Peter: *Intelligent Managing of e-mail through Extraction of Information, the Web and Social Networks*. Supervisor: M. Laclavík

Rodina, Dušan: *Retrieving Design Patterns and Anti-Patterns as Method for Improving Software Quality*. Supervisor: L. Majtás

Ruttikay-Nedecký, Ivan: *Visualization of Program Execution in 3D Environment*. Supervisor: P. Kapec

Szabó, Gabriel: *Implementation of an Interface for Creating Software with Hand Recognition*. Supervisor: J. Štefanovič

Šelmeči, Roman: *Knowledge Base of Software Patterns Realized in Integration Tools*. Supervisor: P. Mederly

Ševce, Ondrej: *Content Recommendation Based on Semantic Analysis of Text*. Supervisor: J. Tvarožek

Štiglic, Filip: *Visual Recognition of Traffic Situation*. Supervisor: J. Štefanovič

Ukrop, Ľuboš: *Visualization of Graph Structures Using SOAP Bubbles*. Supervisor: P. Kapec

Valent, Adam: *Measurement Car Drivers' Reactions*. Supervisor: J. Štefanovič

Zahoranský, Dušan: *Phonetic Person Searching*. Supervisor: I. Polášek

Zeleník, Dušan: *Recommending Based on Similarity Relations*. Supervisor: M. Bieliková

Zelman, Andrej: *Activation Model of Cerebral Cortex*. Supervisor: P. Hubka