User Interface Migration and Adaptation

PHD RESEARCH THEME PROPOSAL

CENTRO DE CIÊNCIAS E TECNOLOGIAS DA COMPUTAÇÃO
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This research theme follows from an ongoing effort to develop tools and techniques for the systematics analysis of interactive systems. We are developing GUISURFER [4, 5, 6], a tool that automatically extracts models from the user interface layer of interactive computing systems' source code. At this time, the tool is able to reverse-engineer Java (either with Swing or GWT) and Haskell (with WxHaskell) application's source code (with varying levels of support). From the source code, GUISURFER extracts a range of models, aiming at supporting the analysis, maintenance and evolution of existing interactive applications. The current proposal aims at building on the current state of the art and explore the generation of UsiXML models from web applications to support application migration between platforms.

Software migration is defined by Chikofsky and Cross [2] as the activity of moving software from its original environment, including hardware platform, operating environment, or implementation language to a new environment. When an application migrates it needs to adapt to the new environment.

UsiXML (USer Interface eXtensible Markup Language) is a XML-compliant markup language that describes a user interface independently of a particular programming language, computing platform and working environment [3]. UsiXML allows for user interfaces to be modelled at several levels of abstraction, and for abstraction/reification and transformation relations to be defined. The language is inspired by the Cameleon framework (Context Aware Modelling for Enabling and Leveraging Effective interactiON), which defines development stages for interactive applications with multiple contexts [1]. These characteristics of the language make it an ideal candidate to support on-the-fly migration and adaptation of user interfaces.

The goal of the project is to propose an approach, and develop tool support, to capture a web site, reverse engineer it into a UsiXML model, and then use that model to reason about and transform the original web site.

The proposal integrates with reverse engineering related tasks in the FCT funded project: CROSS (An Infrastructure for Certification and Re-engineering of Open Source Software – PTDC/EIA-CCO/108995/2008). The project will provide both an active research environment, and funding for missions.

The ideal candidate will have an interest/skills in: reverse engineering and model-based development, with a strong background on web development. The successful candidate should be available to travel abroad to discuss the work and its applicability with research partners.

Funding for the first year of the PhD project is negotiable. A research proposal and/or PhD grant application will be submitted in due course to guarantee the remaining funds.

References

[1] Gaëlle Calvary, Joëlle Coutaz, David Thevenin, Quentin Limbourg, Laurent Bouillon, and Jean V. A unifying reference framework for multi-target user interfaces. *Interacting with Computers*, 15:289–308, 2003.

[2] Elliot J. Chikofsky and James H. Cross. Reverse engineering and design recovery: A taxonomy. *IEEE Software*, 7(1):13–17, 1990.

[3] Quentin Limbourg, Jean Vanderdonckt, Benjamin Michotte, Laurent Bouillon, Murielle Florins, and Daniela Trevisan. UsiXML: A user interface description language for context-sensitive user interfaces. In *Proceedings of the ACM AVI'2004 Workshop: Developing User Interfaces with XML – Advances on User Interface Description Languages*, pages 55–62. Press, 2004.

[4] J. C. Silva, J. C. Campos, and J. Saraiva. Combining formal methods and functional strategies regarding the reverse engineering of interactive applications. In *Interactive Systems*, volume 4323 of *Lecture Notes in Computer Science*, pages 137–150. Springer-Verlag, 2007.

[5] J.C. Silva, J. Saraiva, and J.C. Campos. A generic library for gui reasoning and testing. In *SAC '09: Proceedings of the 2009 ACM symposium on Applied Computing*, pages 121–128. ACM, 2009.

[6] J.C. Silva, C. Silva, R. Gonçalo, J. Saraiva, and J.C. Campos. The guisurfer tool: towards a language independent approach to reverse engineering gui code. In *ACM Symposium on Engineering Interactive Computing Systems (EICS 2010)*. accepted.