Título: **TestDAS: Testing Method for Dynamically Adaptable Software**

Data: **23/11/2017** Horário: **09:30h** Local: **Sala de seminários do bloco 942-A**

Resumo:

The adaptive behavior of Dynamically Adaptive Systems (DAS),such as Dynamic Software Product Lines (DSPLs), is typically designed using adaptation rules, which are context-triggered actions responsible for features activation and deactivation at runtime. This kind of software should have a correct specification at design time and should be appropriately tested to avoid unexpected behavior as an undesired product configuration at runtime. The use of context information and the large number of configurations are challenges related to DAS verification and testing. Therefore, methods and tools supporting these activities are needed to assure quality to adaptive systems.The literatureaddresses different aspects ofDAS testing, but few work deals with changes in the software features configuration, and they did not focuson testing the adaptive mechanism based on the adaptation rules. Also, there is a lack of formalism to model DAS that allows to reason on the actions triggered by adaptationrules over the DAS activated features. In this thesis, a testing method, called TestDAS, is proposed to address these gaps. It involves a model checking approach to identify faults in the adaptation rules design and a set of criteria for tests generation of DAS. The method is based on a model of the adaptive behavior, called Dynamic Feature Transition System (DFTS), which specifies the DAS configurations and the context changes. Moreover, a tool is implemented to support the TestDASuse for generating tests, and a library calledCONTroLis developed to support the execution of such tests. The evaluation ofTestDAS is performed using: (i) a fault injection in DAS specifications to evaluate the effectiveness of the model checking approach proposed; (ii) a controlled experiment to comparetests generated by TestDASwith tests specified based on the volunteer'sexperience; and (iii) a proof of concept to assess the TestDAS feasibility, in

which volunteers generate and run tests using the TestDAS tool and CONTroL, respectively. The results of the effectiveness evaluation gathered evidence that TestDAShelps in the identification of faults related to adaptation rules design. The experiment, in turn, provides evidence that TestDAS generates more tests and tests with better coverage than experience based testing.Finally, the proof of concept confirms that the TestDAStool and CONTroLcan support the testing and model checking of dynamically adaptive systems.

Banca:

- Profª. Drª. Rossana Maria de Castro Andrade (MDCC/UFC - Orientadora)
- Prof. Dr. Pedro de Alcântara dos Santos Neto (UFPI - Coorientador)
- Prof. Dr. Guilherme Horta Travassos (UFJR)
- Prof. Dr. Jerffeson Teixeira de Souza (UECE)
- Prof. Dr. Lincoln de Souza Rocha (MDCC/UFC)
- Prof. Dr. Eduardo Santana de Almeida (UFBA)