

**UNIVERSITY GRADUATE SCHOOL BULLETIN
ANNOUNCEMENT**

Florida International University
University Graduate School

Doctoral Dissertation Defense

Abstract

Formal Verification and Testing of Software Architectural Models

by

Gonzalo Argote Garcia

Ensuring the correctness of software has been the major motivation in software research. Due to its impact in the final implementation, one critical aspect of software is its architectural design. By guaranteeing a correct architectural design, major and costly flaws can be caught early on in the development cycle. Software architecture design has been a subject of extensive research in the past years. However, there is still more to be done, such as providing adequate formal analysis of software architectures. On these regards, a framework to ensure system dependability from design to implementation has been developed at Florida International University. This framework is based on SAM (Software Architecture Model), an Architecture Description Language, based on Petri nets and temporal logic.

This dissertation presents a formal verification and testing approach to ensure the correctness of Software Architectures in SAM. The formal verification technique applied is model checking and the model checker of choice is Spin. A SAM model is formally translated to a model in the input language of Spin and verified for its correctness. In terms of testing, test cases based on Petri net testing theory are evaluated at the design level for the testing process. The information in the design is also used to derive test cases for the implementation testing. In addition, a modeling and analysis tool (SAM tool) is implemented to support the design and analysis of architectures in SAM. The results show the applicability of the approach to testing and formal verification of SAM models with the aid of the modeling and analysis tool.

Date: March 26, 2009

Time: 11:00 a.m.

Place: University Park, ECS 349

Department: Computing and Information Sciences

Major Professor: Dr. Xudong He