PIRE 2009 Project Proposal

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Research Area Keywords: domain-specific languages, meta-modeling, model simulation, user-centric communication

Project Title: Engineering a Communication Modeling Language using Kermeta

Problem Statement:
The design and evolution of domain specific languages like the Communication Modeling Language (CML) is never easy. Besides grammar design, static semantics and behavioral specifications need to be considered as well. In this joint project, I am going to use a metamodeling tool, Kermeta, to engineer CML in the CVM project. By building a simulation environment in the Kermeta language for the Synthesis Engine, a layer in CVM, various aspects of CML, including its static semantics and operational semantics, would be explicitly specified at the metamodel level. Kermeta would enable direct simulation of the execution of a CML model in the synthesis engine.

Motivation and Impact:
Semantics for modeling languages is a crucial issue in the "Model-Driven" community. As a model driven practice, the CVM project is in strong need of a modeling tool that facilitates the engineering of CML. The Kermeta project led by the Triskell team provides us such a metamodeling framework. Collaboration between CVM project at FIU and the Kermeta project in Rennes will benefit both parties.

Current Status:
The communication modeling languages as now in the CVM project is defined in an ad-hoc manner. Although it has explicitly defined abstract syntax using XSD document, the static semantics and operational semantics are not clearly identified and expressed.

Research Roadmap:
The expected outcome of my research is as follows:

- Milestone1 / 2 weeks: Define the abstract syntax and static semantics of CML in the Kermeta language and be able to validate its Well-Formed-Rules (WFR) using Kermeta
- Milestone2 / 4 weeks: Weave in the operational semantics of CML, including schema negotiation, media transfer, etc. and be able to simulate its execution using Kermeta
- Milestone3 / 4 weeks: Incorporate simplified workflows into the CML structural and behavioral specifications and possibly do a simulation of a simplified workflow

Relation to PIRE Core Research Projects:
This project conforms to the PIRE theme: the realization of an enabling application development paradigm called Transparent Cyberinfrastructure Enablement (TCE). It fits into the modeling of "Healthcare Communication Application" Box in the "CI Application Layer". Basically, various modeling frameworks and methodologies are sought after, in this case the Kermeta framework, for the domain experts to rapidly create, design and code their applications with minimal affection to the underlying CI.