FIU FLORIDA INTERNATIONAL UNIVERSITY

INRIA INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE

LAGrid Latin American Grid

Engineering a Communication Modeling Language Using Kermeta

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I. Research Overview and Outcome

A. Introduction

❖ The convergence of data, voice, and multimedia communication over digital networks resulted in a proliferation of communication technologies
❖ Despite these new improvements, no ways exist to build customized new comm. services
❖ The Communication Virtual Machine (CVM) project represents a paradigm shift in how new customized comm. services are conceptualized and realized. through a Communication Modeling Language (CML) and a model driven platform

Breathing life into metamodels

Kermeta

Actions
Metadata
Transformations
Constraints

Used for
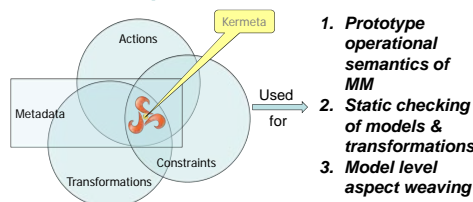
1. **Prototype operational semantics of MM**
2. **Static checking of models & transformations**
3. **Model level aspect weaving**

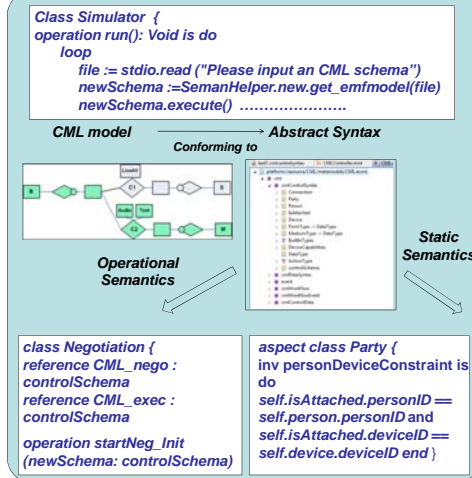### E. Engineering CML

❖ Specifying CML metamodel (ECORE)
❖ Specifying CML static seman. via Kermeta Invariants
❖ Encoding CML operation semantics through model transformations via a state based approach
❖ Addressing concurrency issues of CML through interleaving semantics
❖ Building model loaders and simulators

B. Proposed problem

❖ CML has been used for the high level spec. of user-centric communication services.
❖ CML 1.0 abstract syntax are formal specified but lacking a formal specification and validation of its static semantics and operational semantics
❖ Kermeta, an executable metamodeling language, provides an integrated framework for engineering domain specific languages like CML.

D. Materialization Method

```
Class Simulator {
operation run(): Void is do
   loop
      file := stdio.read ("Please input an CML schema")
      newSchema :=SemanHelper.new.get_emfmodel(file)
      newSchema.execute() .....................
```

CML model ⟶ Abstract Syntax
          Conforming to

Operational Semantics   **Static Semantics**

```
class Negotiation {
reference CML_nego :
controlSchema
reference CML_exec :
controlSchema

operation startNeg_Init
(newSchema: controlSchema)
```

```
aspect class Party {
inv personDeviceConstraint is
do
self.isAttached.personID ==
self.person.personID and
self.isAttached.deviceID ==
self.device.deviceID end }
```

C. Methodology

❖ Using Kermeta as an integrated metamodeling framework for specifying metamodel , actions, constraints and transformations of lang. like Communication Modeling Language (CML)
❖ Incremental language development
  ➢ Start with basic language primitives
  ➢ Iteratively add lang. constructs (workflow)
❖ Aspect Oriented Modeling
  ➢ Model static constraints as aspects
  ➢ Model execution behaviors as aspects

F. Results

❖ Have successfully validated the execution semantics of CML models through generating instances of the target language: executable communication control scripts
❖ A byproduct : the design and implementation of an interleaving concurrency framework for simulating concurrency in Kermeta

G. Conclusion & Future Work

❖ Using an integrated framework like Kermeta facilitates rapid validation & prototyping of CML
❖ The semantics specification of CML is sound and sufficient for automatic synthesis of user-centric communication services
❖ Using Aspect Oriented Modeling for specifying various aspects of model semantics like workflow and autonomic behaviors

II. International Experience

❖ Learn to **adapt to** a changing environment and culture and to appreciate it meanwhile

❖ Learn to get out of the "comfort zone" and interact with people of different backgrounds leading to **personal enrichment**

❖ Understanding a different view of life: **simple yet full lifestyle** (good friends, fun and food) → Enjoy life via the simplest yet elegant ways : C'est la vie!

PIRE is more far reaching than research work itself. It shapes me *both* ___personally___ *and* __professionally__

❖ **Get new insights** on the research area of Model Driven Development through interaction with other fellow researchers

❖ **Gather feedbacks** from other perspectives on my current research problem

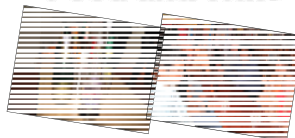❖ **Learning new** metamodeling **techniques** and tool for engineering Domain Specific languages

Traveling

Traveling around France and even Italy!

Food and Wine

The French enjoy every bite of food and every sip of wine

❖ Paris: Fascinating and breathtaking sights, no wonder it is the No #1 tourist destination in the world!

❖ Venice: Sinking city? As long as there is Gondola boat, it will be fine☺

Our Team

Our Collaborators

Coffee Break

The Work Cluster

At Work

The Triskell team at University of Rennes

III. Acknowledgement