Introduction to WP3: Advanced Type Systems for Interacting Entities

Davide Ancona

DIBRIS, Università di Genova

T-LADIES kick-off meeting, Pisa, July 6-7, 2022

Main aims

Types as support to SW development and evolution

Challenges

- domain: dynamically evolving distributed systems (≡ IoT systems)
- scalability
- locating misbehaving entities
- types to drive correct code composition/synthesis

Involved dimensions

- locality/globality=bottom up/top down development
- static/dynamic verification
- functional/non-functional properties

Guarantees for heterogeneous entities

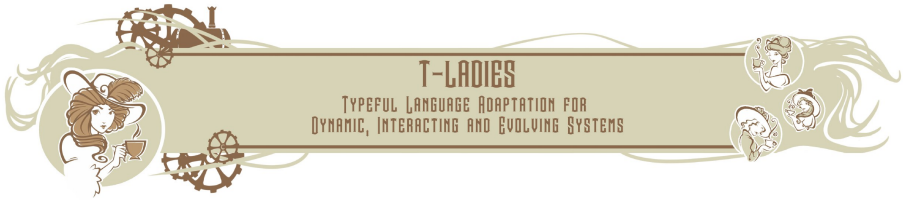
- interoperability
- adaptability
- correct composition

Structure of task T3

Subtasks and involved units

- T3.1: Behavioral types of entities
  - involved units: CT, GE, MI, MR, PI (five of a kind!)
- T3.2: Integration of static and dynamic verification
  - involved units: GE, PI (one pair . . .)
- T3.3: Substructural types for entities
  - involved units: GE, MI (one pair . . .)

T3.1
Behavioral types



In a nutshell

Global/local types to

- specify and verify asynchronous interactions between multiple parties
- correct code composition/synthesis of distributed entities

Technical presentation

Global Types for Multiparty Sessions. Paola Giannini (PO-GE)

T3.2
Static and dynamic types

In a nutshell

- more expressive languages for runtime monitoring and verification:
  RML Runtime Monitoring Language
- combination of static and dynamic checking for
  - early error detection
  - scalability and optimization

T3.3
Substructural types

In a nutshell

- advanced types for specifying and verifying non-functional properties
- examples: resource sensitive properties as synchronization capabilities, computational power and storage space

Technical presentation

Coeffects for Java-like languages. Riccardo Bianchini (GE)