Towards Self-Adaptable Languages

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Context

Software ...

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- Evolve in complex/changing environment (e.g, Cloud, embedded systems)
- Need dynamic adaptation to best deliver the service (e.g., Waymo[1], Netflix[1])

[1] Cf. `https://waymo.com`, `https://www.netflix.com`

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Vision : abstract self-adaption into high level language constructs

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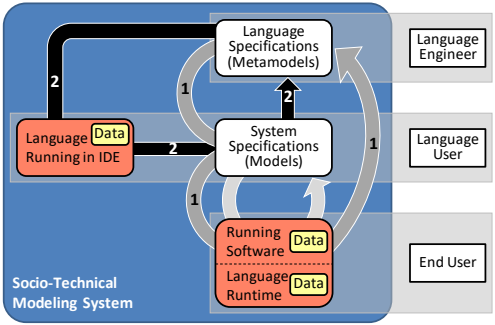
What is a Self-Adaptable Language ?

" *A software language that abstracts the design and execution of feedback loops in the design-time environment and the run-time environment* "

1. Free the language user from the implementation of :
   - The feedback loop
   - The trade-off analysis
2. Allow continuous and automatic evolution of itself

L-MODA | Languages, Models, and Data



L-MODA Reference Framework for Self-Adaptable Languages

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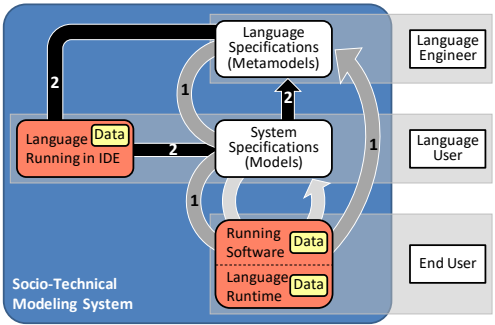

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→ adaptation of language semantics

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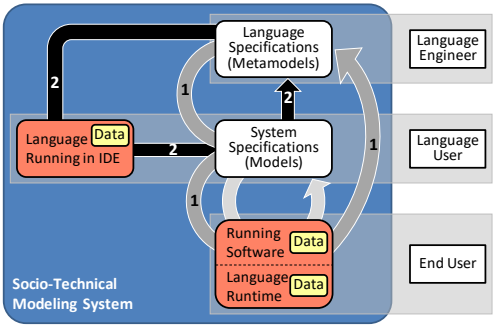

L-MODA Reference Framework for Self-Adaptable Languages

1) Runtime Feedback Loop

Use run-time data, model & metamodel
→ adaptation of language semantics

2) Design Feedback Loop

Use design-time data, models & metamodel
→ adaptation of syntax, pragmatics & semantics

Research Roadmap

Support of the Runtime Feedback Loop

- Feedback loop configuration
- A reference framework for common implementation [1]
- ...

Support of the Design Feedback Loop

- Model the development context
- Detect evolution opportunities
- Navigate in evolution of programs
- ...

[1] G. Jouneaux, O. Barais, B. Combemale, *et al.*, "SEALS: A framework for building Self-Adaptive Virtual Machines," in *Proceedings of the 14th ACM SIGPLAN International Conference on Software Language Engineering (SLE '21)*, Chicago, United States, Oct. 2021. DOI: 10.1145/3486608.3486912

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For more details take a look at our paper

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