

# PyPinT

Towards a framework for rapid prototyping of iterative parallel-in-time algorithms

May 28, 2014 | Dieter Moser, Torbjörn Klatt, Dr. Robert Speck <[{d.moser,t.klatt,r.speck}@fz-juelich.de](mailto:{d.moser,t.klatt,r.speck}@fz-juelich.de)> | 3rd Workshop on Parallel-in-Time Integration Methods

# Overview

- 1 Recap of existing Parallel-in-Time Algorithms
- 2 The *PyPinT* Framework Explained
- 3 Goals
- 4 Proof of Concept — Examples Analyzed



# PyPinT

## Part I: Existing Parallel-in-Time Approaches

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# Parareal

# RIDC

# PFASST



# PyPinT

## Part II: The PyPinT Framework Explained

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## Basic Concept

- *Python ≥3.2* as language of choice
  - for ease of use and extensibility (cf. *NumPy*, *SciPy*)
- well-conceived and intuitive abstract interfaces
  - for reusable code ensuring DRY principle
- modular building blocks
  - for fast exchange of algorithms' building blocks
- integrated analyzation tools
  - for introspection and plotting (cf. *matplotlib*)
- usage of a sophisticated testing framework
  - nobody writes bug-free code

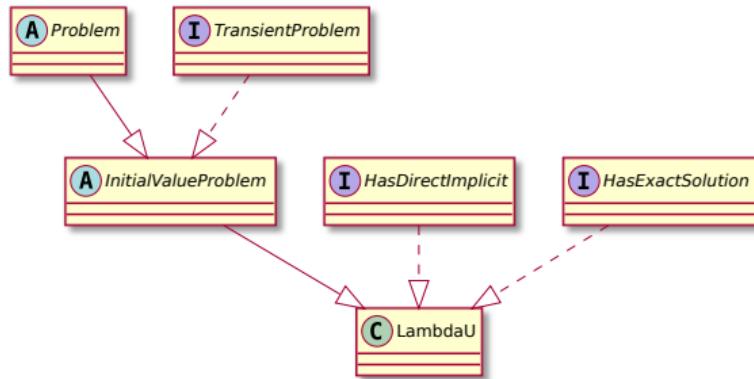


# Modules

## Abstract Modeling of PinT Algorithms

```
pypint
  ~.problems
  ~.solvers
  ~.integrators
  ~.communicators
  ~.multi_level_providers
  ~.plugins
  ~.solutions
```

- interfaces for problem setups
- generic problem with specializations via mixins



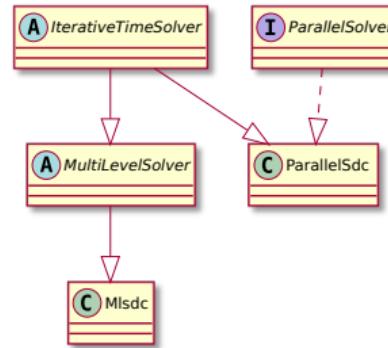
# Modules

## Abstract Modeling of PinT Algorithms

pypint

```
~.problems
~.solvers
~.integrators
~.communicators
~.multi_level_providers
~.plugins
~.solutions
```

- interfaces for iterative time solvers
- providing generic building blocks of solvers





# PyPinT

## Part III: Goals for PyPinT

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## Part IV: Proof of Concept

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# Thank you for your attention!

## Questions?

(now or later)

*PyPinT* is on  GitHub: <https://github.com/Parallel-in-Time/PyPinT>

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