Projet IOP
Intégration d'outils à CosyVerif

Étienne André, Fabrice Kordon, Alban Linard, Laure Petrucci

Etienne.Andre@univ-paris13.fr, Fabrice.Kordon@lip6.fr, Alban.Linard@lsv.ens-cachan.fr,
Laure.Petrucci@lipn.univ-paris13.fr

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CosyVerif

Motivation

Dissemination of Verification Tools

- Application of formal methods to dedicated cases studies
- Towards technological transfer to industry
- Tools organised around formalisms

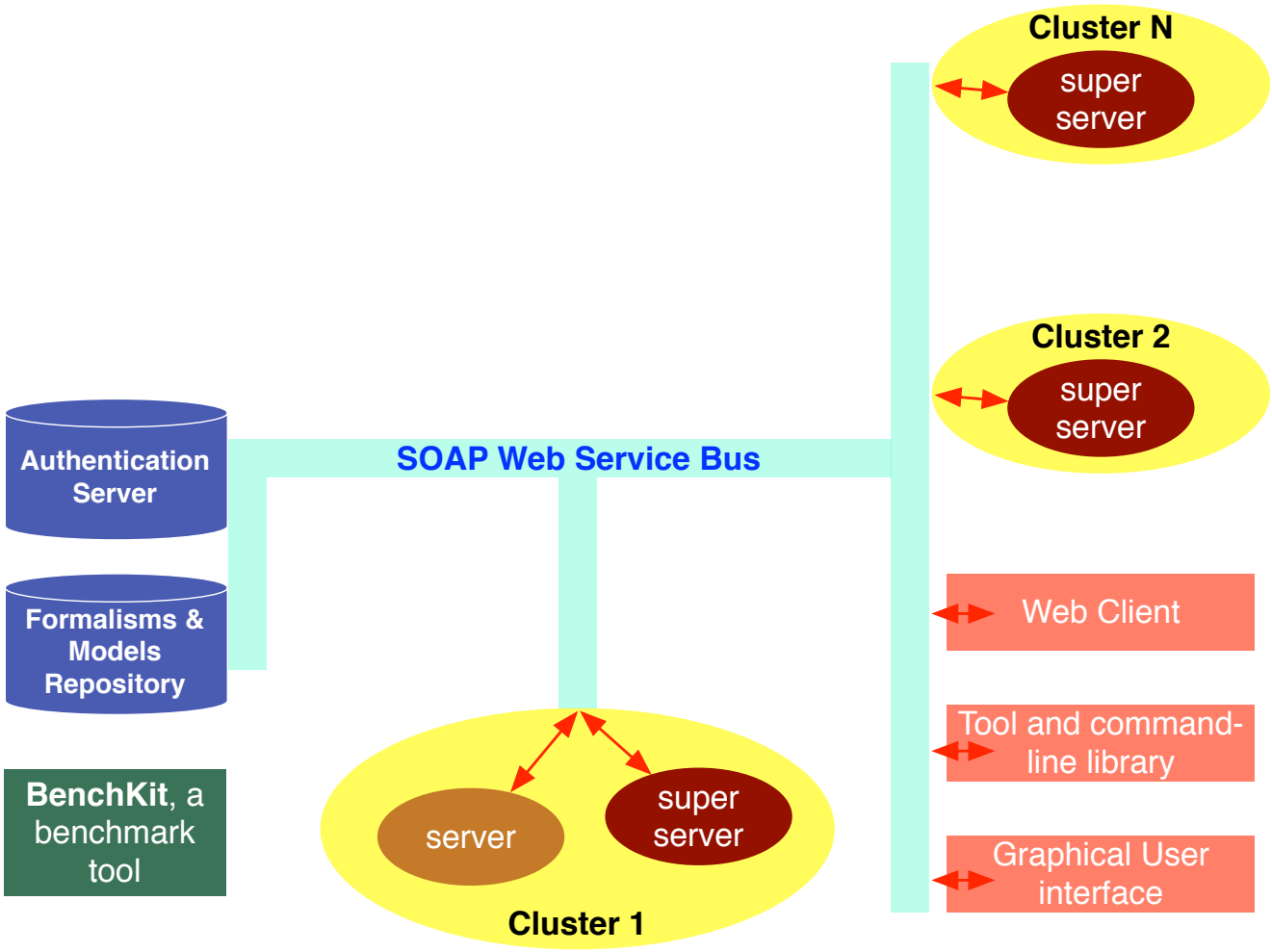
Academics $\neq$ Developers 

- Need to share effort (platform, interfaces, distribution mechanisms)
- Need to share definitions (typically formalisms)
- Coordinated effort to better handle a complex context of interrelated formal notations
  - Variants of Petri nets
  - Variants of automata
  - etc.

Principles of the *CosyVerif* platform

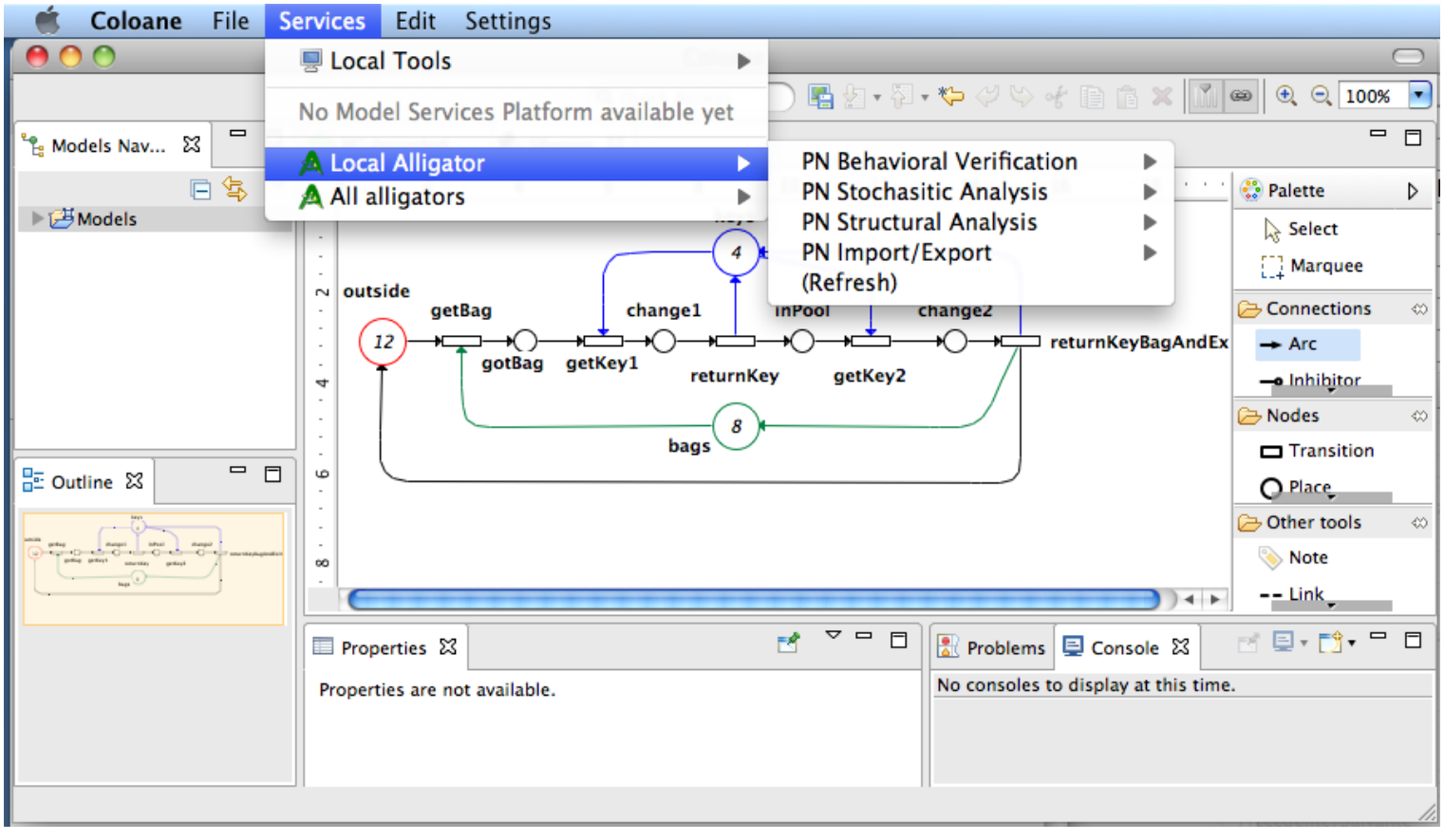
- Distributed and open [AHHKLLP13]
  - Developed at ENS Cachan, Paris 13, UPMC, etc.
- Supports different families of formalisms
  - automata
  - Petri nets
- 12 concrete formalisms
- 2-layered XML-based description language: [ABDHHKLP13]
  - FML, Formalism Markup Language (modelling language description)
  - GrML, Graph Markup Language (actual model description)
- Reuse of existing formalisms
- Open to new tool contributions
- Tools invoked through web services transparent to the user
- Graphical user interface: Coloane
- Repository of models

The *CosyVerif* Architecture



The *Coloane* User Interface

The *Coloane* User interface (Graphical client)



Command-line client is also available for script-based access to tools

Formalisms and Tools

Formalisms	Tools	
Petri Nets	PROD (Univ. Helsinki, Symmetric nets)	
	PNXDD (LIP6, Symmetric nets)	[Kordon et al., 2012]
	Crocodile (LIP6, Symmetric nets w. bags)	[Colange et al., 2011]
	Cunf (LSV, P/T nets)	[Baldan et al., 2012]
	Cosmos (LSV, Stochastic Petri nets)	[Ballarini et al., 2011]
	GreatSPN invariants (Univ. Torino, P/T nets)	
	Helena (LIPN, HL nets)	[hel, 2014]
	ModGraph (LIPN, HL nets)	[Lakos and Petrucci, 2004]
	ObsGraph (LIPN, HL nets)	[Klai and Ochi, 2012]
	Structural bounds (LIP6, P/T nets)	
	Unfold into P/T nets (LIP6, Symmetric nets)	
	Various exports (LIP6, P/T nets)	
Automata	Imitator (LIPN, Timed automata)	[André et al., 2012]
	Modgraph (LIPN, Synchronised automata)	[Lakos and Petrucci, 2004]

Goal of the GDR GPL Project

Goals

1. Integrate more tools into the *CosyVerif* platform
2. Establish an integration procedure that will benefit for other tools to be integrated in *CosyVerif*

Use of the fundings: 2 interns hired:

- Henoc Khouilla (LIPN)
- Idrissa Sokhona (LIP6)

Integration of GreatSPN

Tool for invariant computation for Petri nets

Status before the work

- Not integrated, but integrated into CPN-AMI (ancestor of *CosyVerif*)

Work achieved

- Integrating the functions of the tool (Place invariants, Transition invariants, Minimal syphon, Minimal traps)
- Translating the internal *CosyVerif* format into the one of CPN-AMI, thus enabling the reuse of the previous translators
- Testing and benchmarking was done to access the new integration's results compared to ones provided by CPN-AMI

Integration of ModGraph

Tool for construction and analysis of modular state spaces [Lakos and Petrucci, 2004]

Status before the work

- Previously integrated in *CosyVerif*, but it provided only a poor user interface

Work achieved

- Upgrade the ModGraph service to the latest version of the tool;
- Enhance the user interface provided by the service.

Integration of ObsGraph

BDD-based tool implementing a verification approach for workflows using Symbolic Observation Graphs [Haddad et al., 2004, Klai and Ochi, 2012]

Status before the work

- Previously integrated in *CosyVerif*, but it provided only a poor user interface

Work achieved

- Upgrade the ObsGraph service to the latest version of the tool;
- Enhance the user interface provided by the service;
- Upgrade the service by interaction with the tool developer, for instance the addition of new services above the ObsGraph tool.

Integration of Helena

Explicit state model checker (a High-level Petri net is used for models) [hel, 2014]

Status before the work

- Not integrated

Work achieved

- First attempt to the integration of Helena in *CosyVerif*
- A prototype was obtained, but not polished enough to be released yet. (Integrating Helena is difficult because a translation from the *CosyVerif* model format to Helena's one must be defined.)

Teaching Experience Report

[A., Kordon, Petrucci, 2014]

Univ. Pierre & Marie Curie

- course attended by 25 students
- students had to provide a small individual project as homework
- only issue (first practical session only, since patch was then provided): misuse of the permissions leading to a crash, due to Eclipse embedded libraries for Coloane
- students downloaded the bundle and provided their project on time

Univ. Paris 13

- course attended by 20 students
- anonymous aftercourse evaluation
- 87% satisfied or very satisfied by their experience

Recent and Ongoing Evolutions

- Asynchronous tool invocation
  - Get the result later (e.g. by email)
- Federation of servers and use of clusters
  - Enable load balancing
- Repository of formalisms and models
- Command-line version of the underlying platform

Future Evolutions

- Enhanced interaction between tools
  - Output of a tool as input of another one
- Handling semantics (bridges between formalisms)
  - Also allows system simulation
- Handling heterogeneous models (mixing different formalisms)

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Try it!

http://cosyverif.org/

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