

EXTENDING MODULAR PNML TO COVER HIGH-LEVEL FEATURES

Alexis Marechal
University of Geneva



MeFoSyLoMa workshop
15/06/12

Outline

Outline

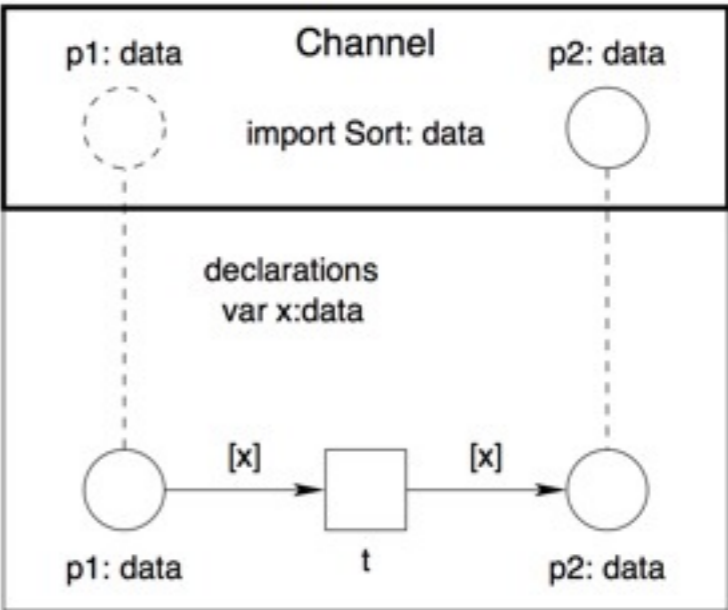


Scope

Outline



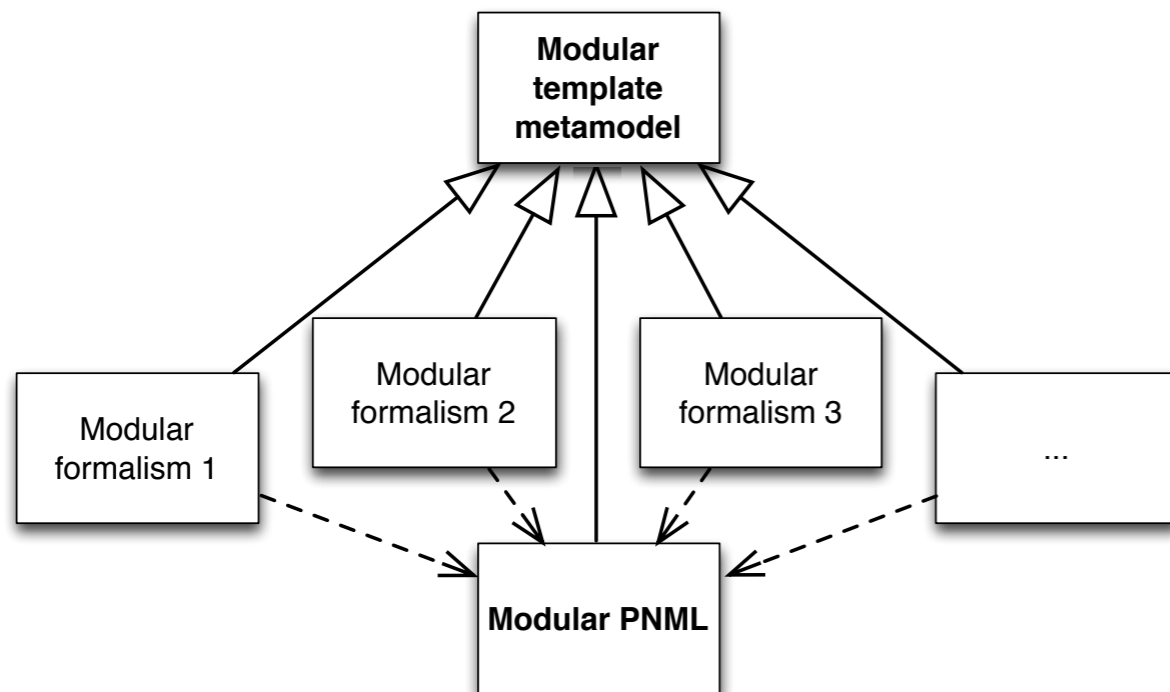
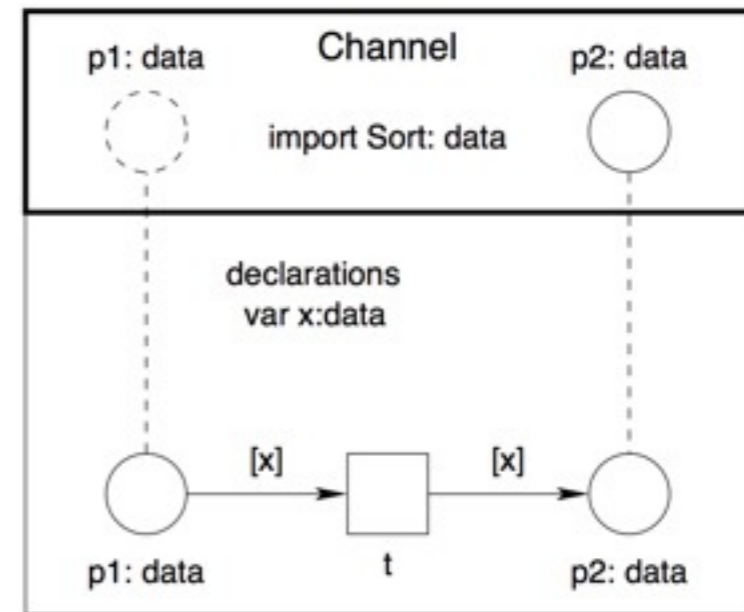
Scope



Outline



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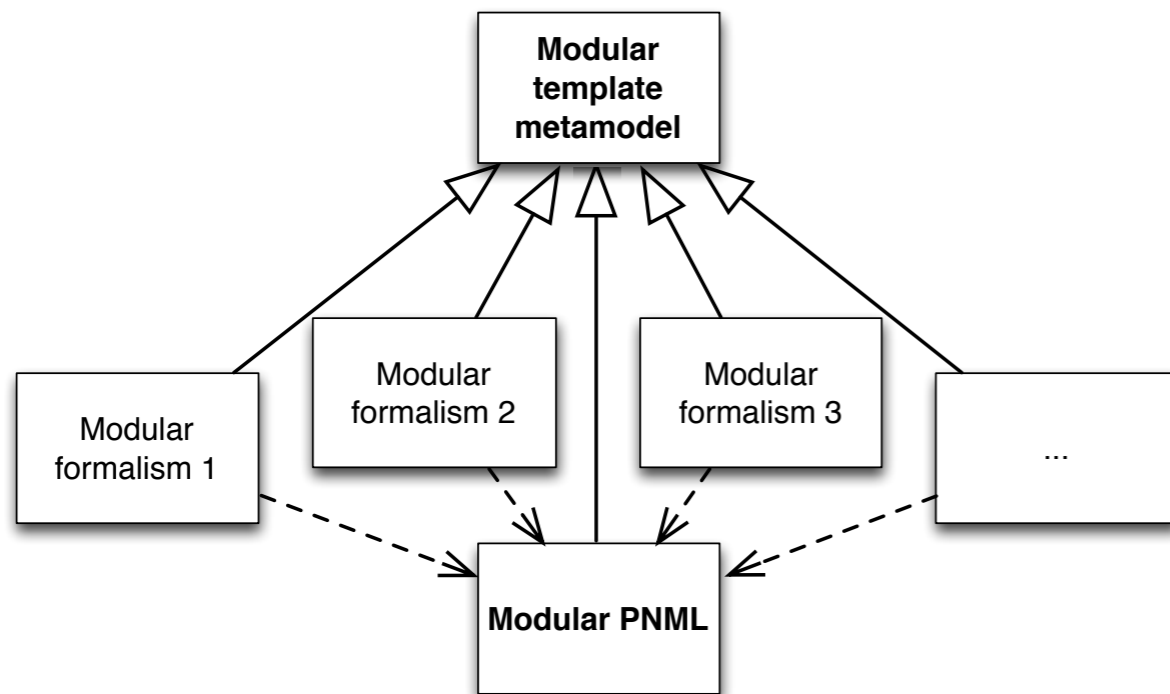
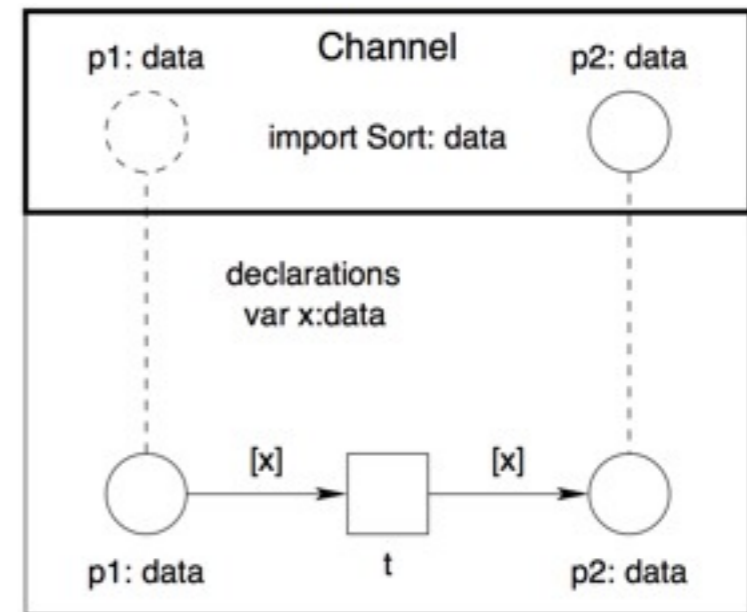


Methodology

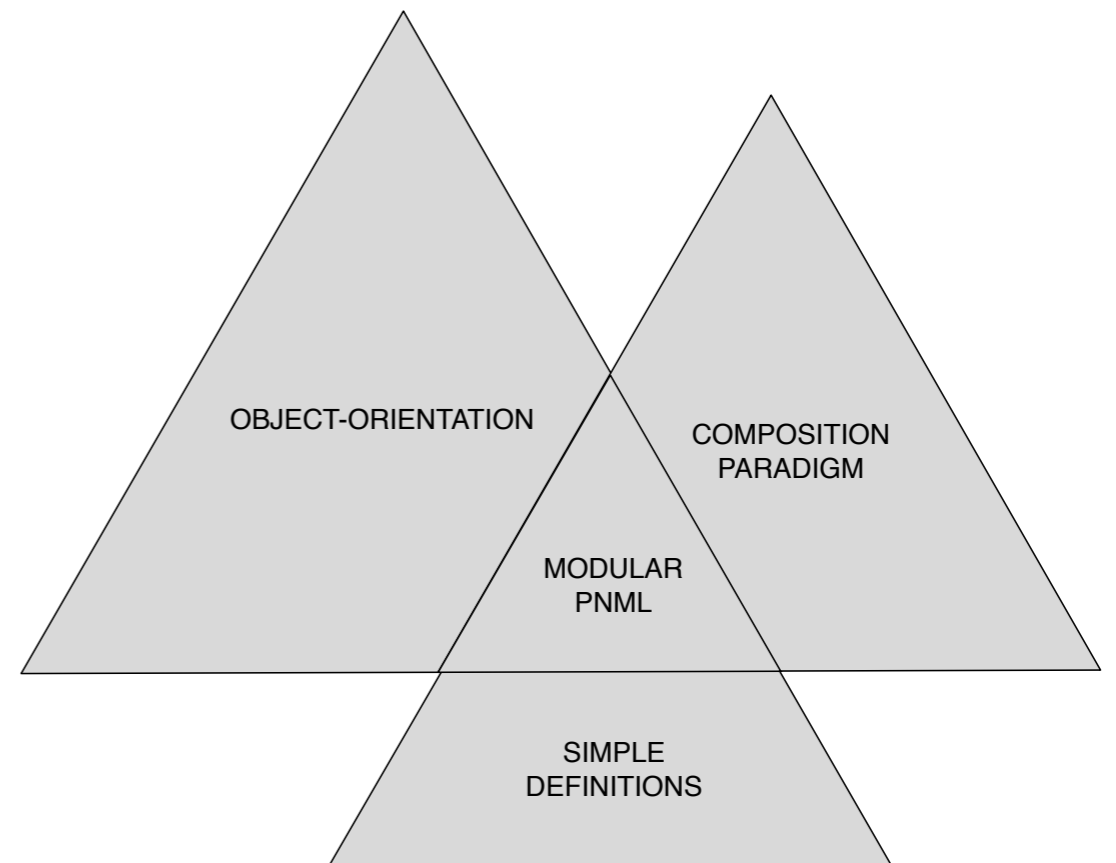
Outline



Scope



Methodology

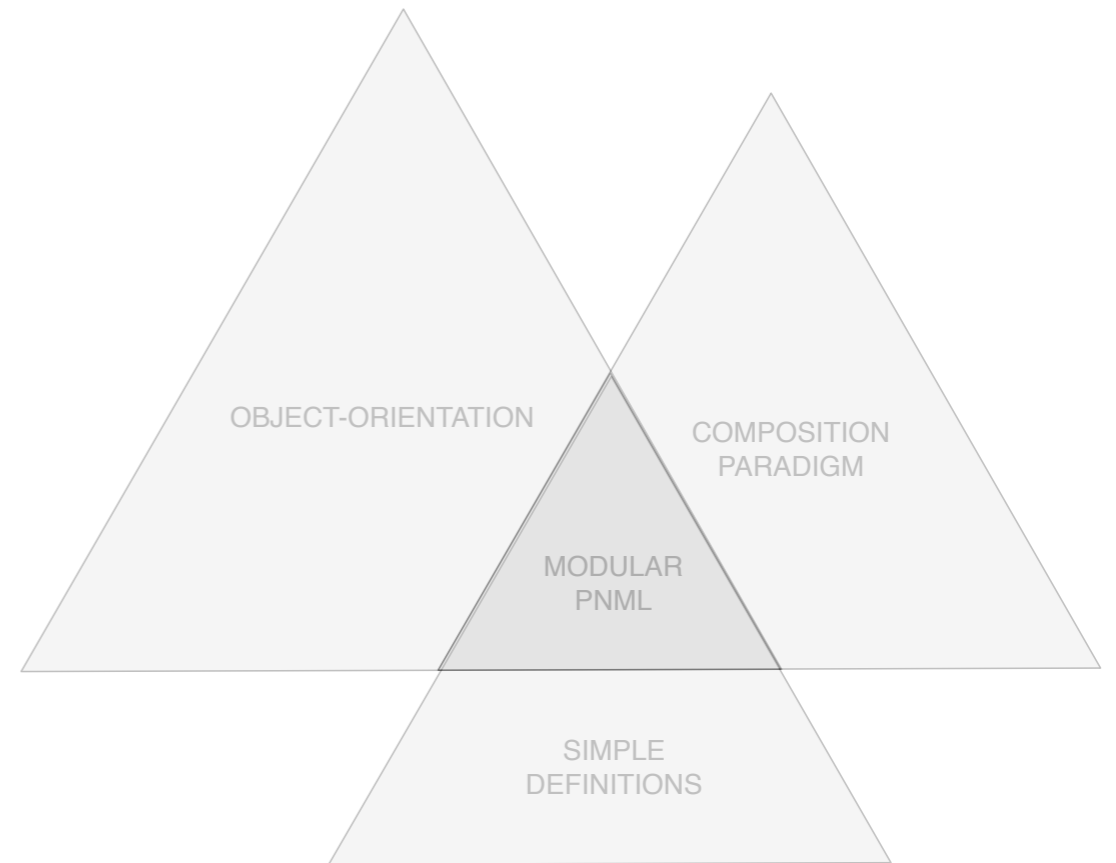
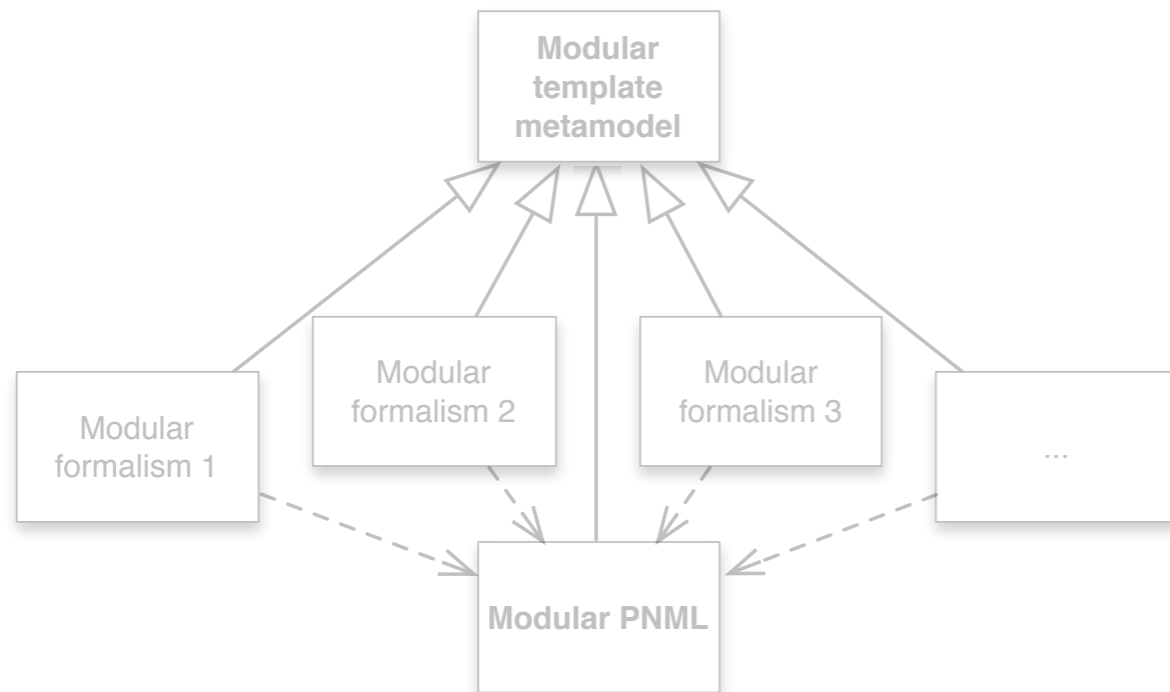
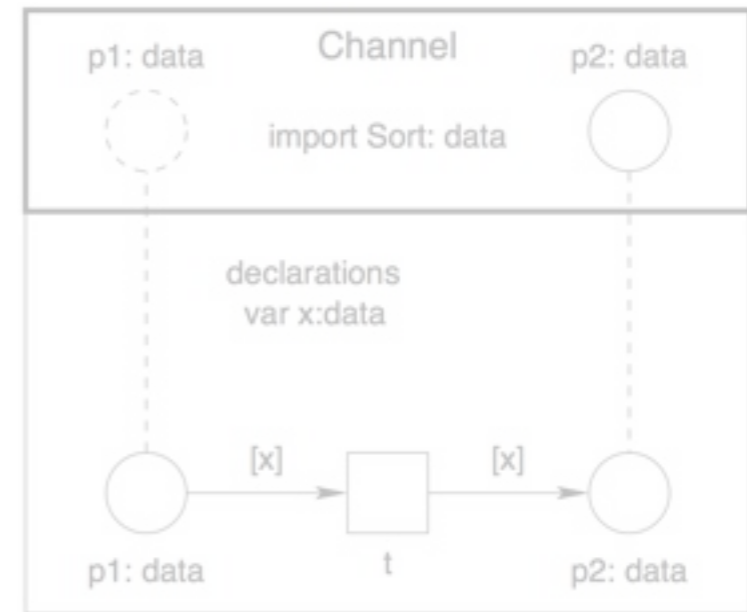


Extensions

Outline



Scope





ISO-IEC 15909



ISO-IEC 15909

Part 1: Definitions

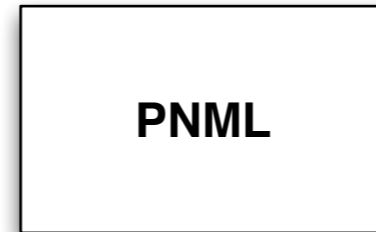


ISO-IEC 15909

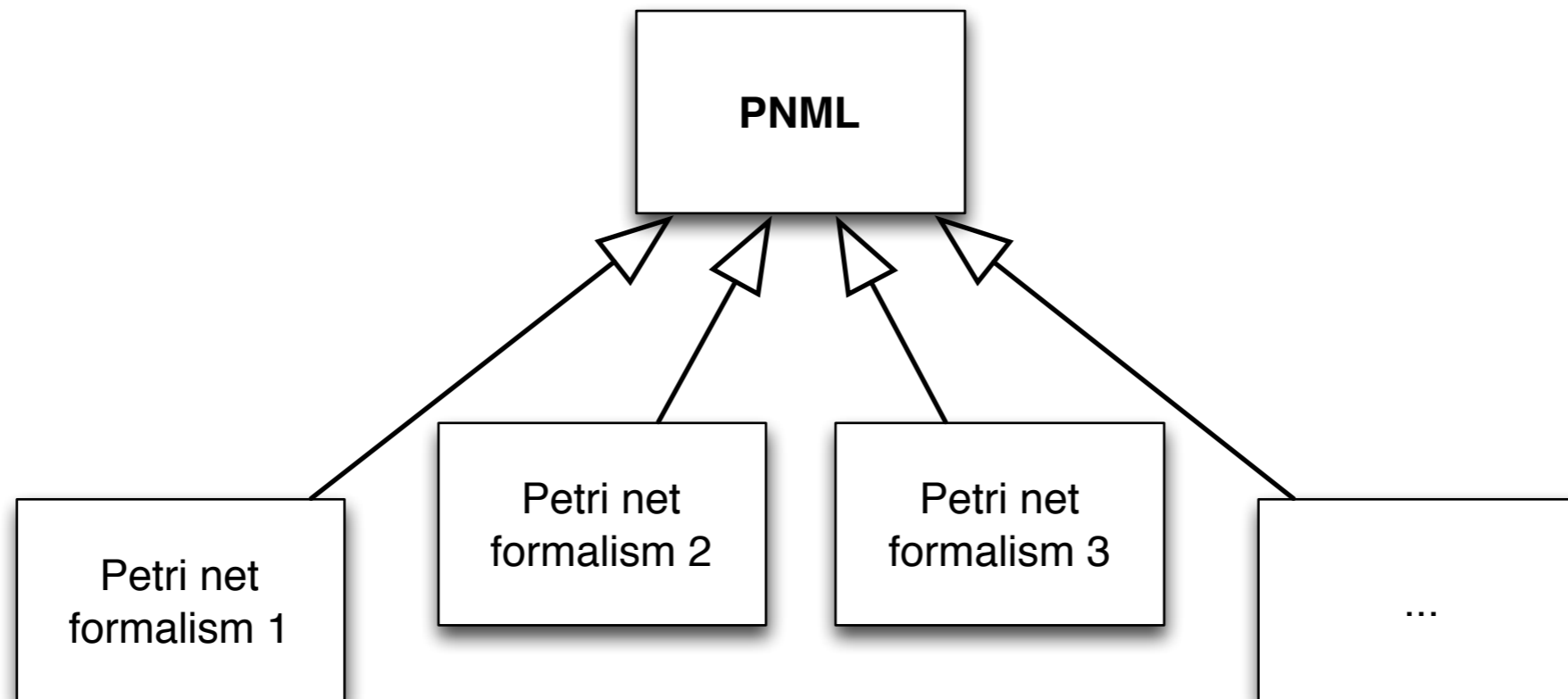
Part 1: Definitions

Part 2: PNML

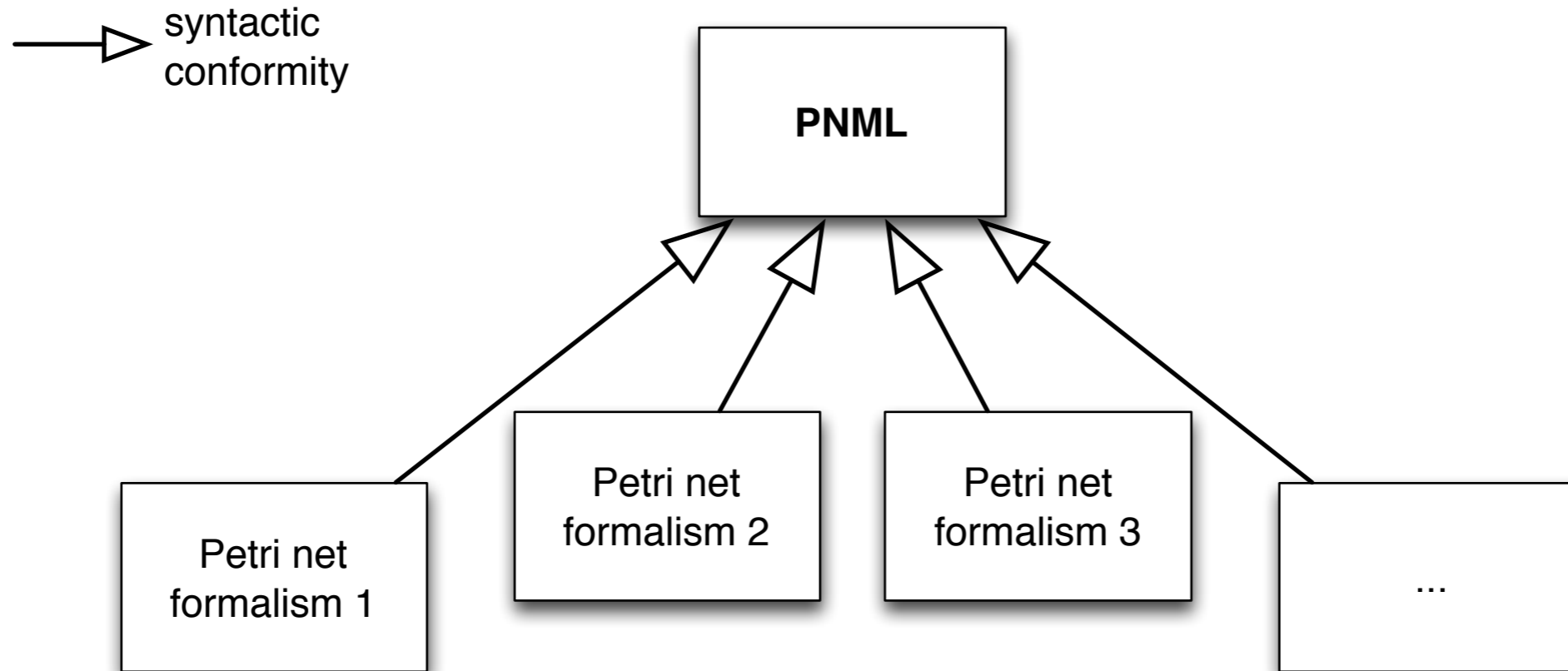
Part 2: PNML



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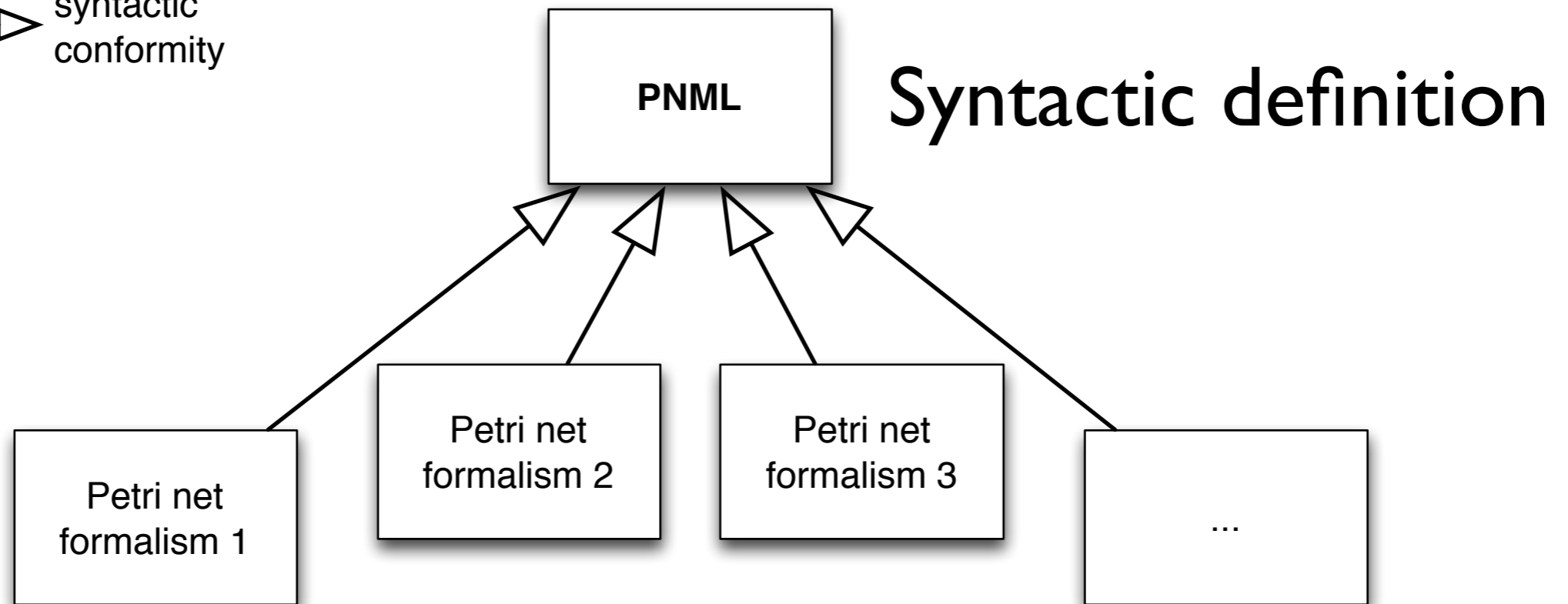


Part 2: PNML



Part 2: PNML

→ syntactic conformity





ISO-IEC 15909

Part 1: Definitions

Part 2: PNML



ISO-IEC 15909

Part 1: Definitions

Part 2: PNML

Part 3: Extensions

Part 3: Extensions

Part 3: Extensions

Probabilities

Time

Modularity

Priorities

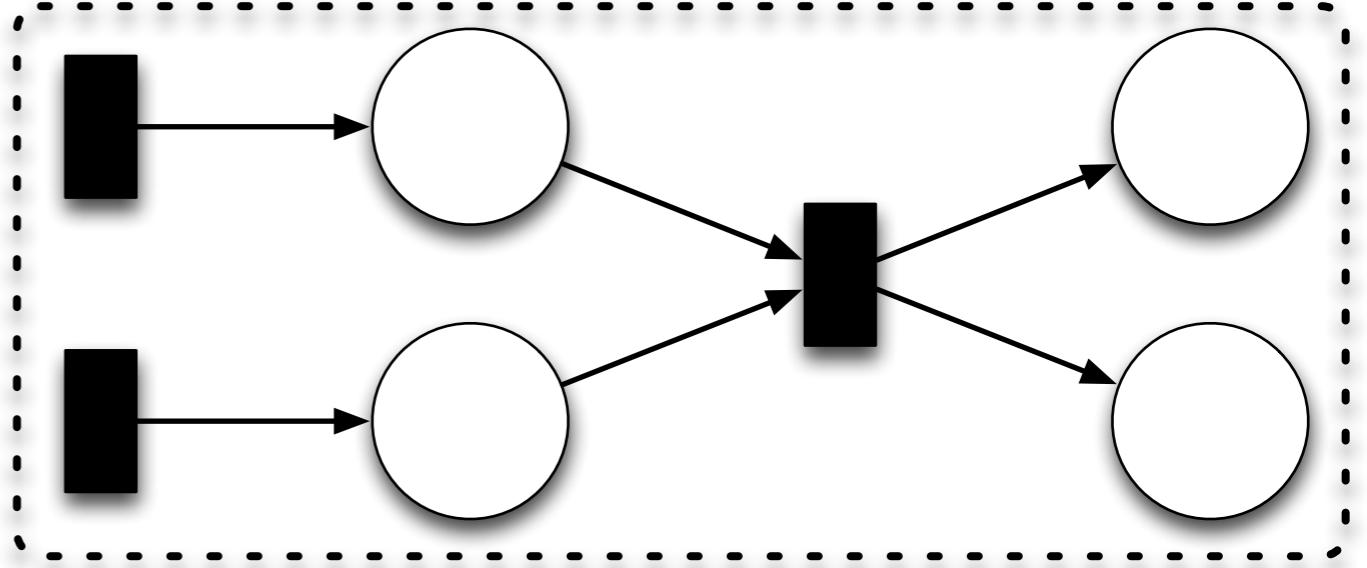
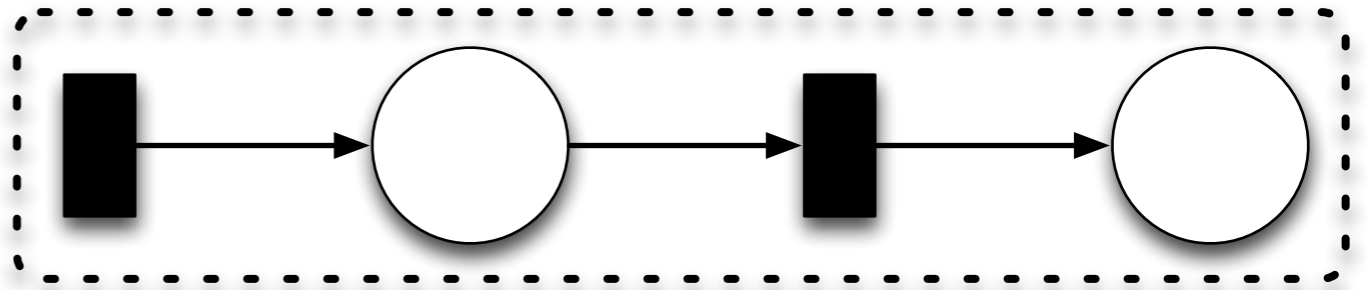
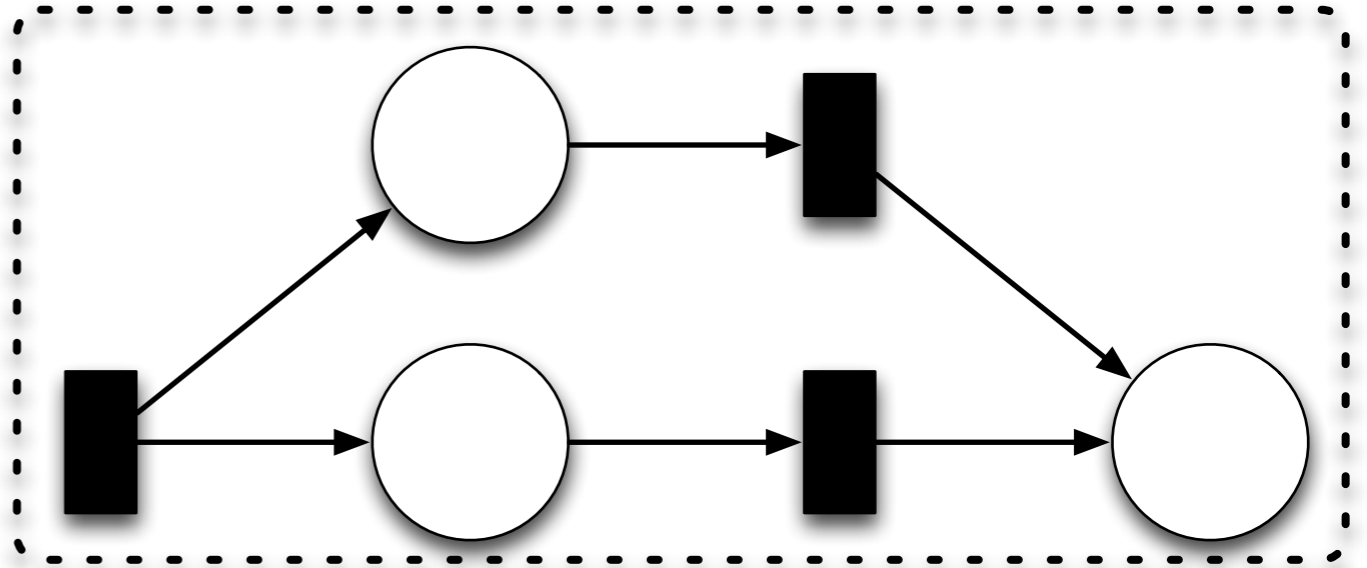
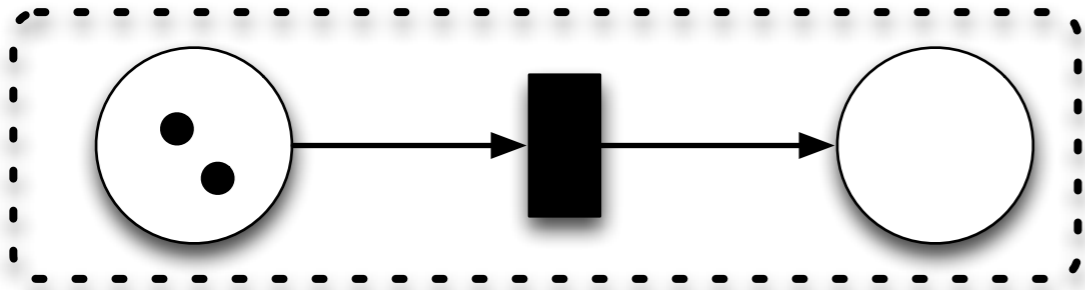
Part 3: Extensions

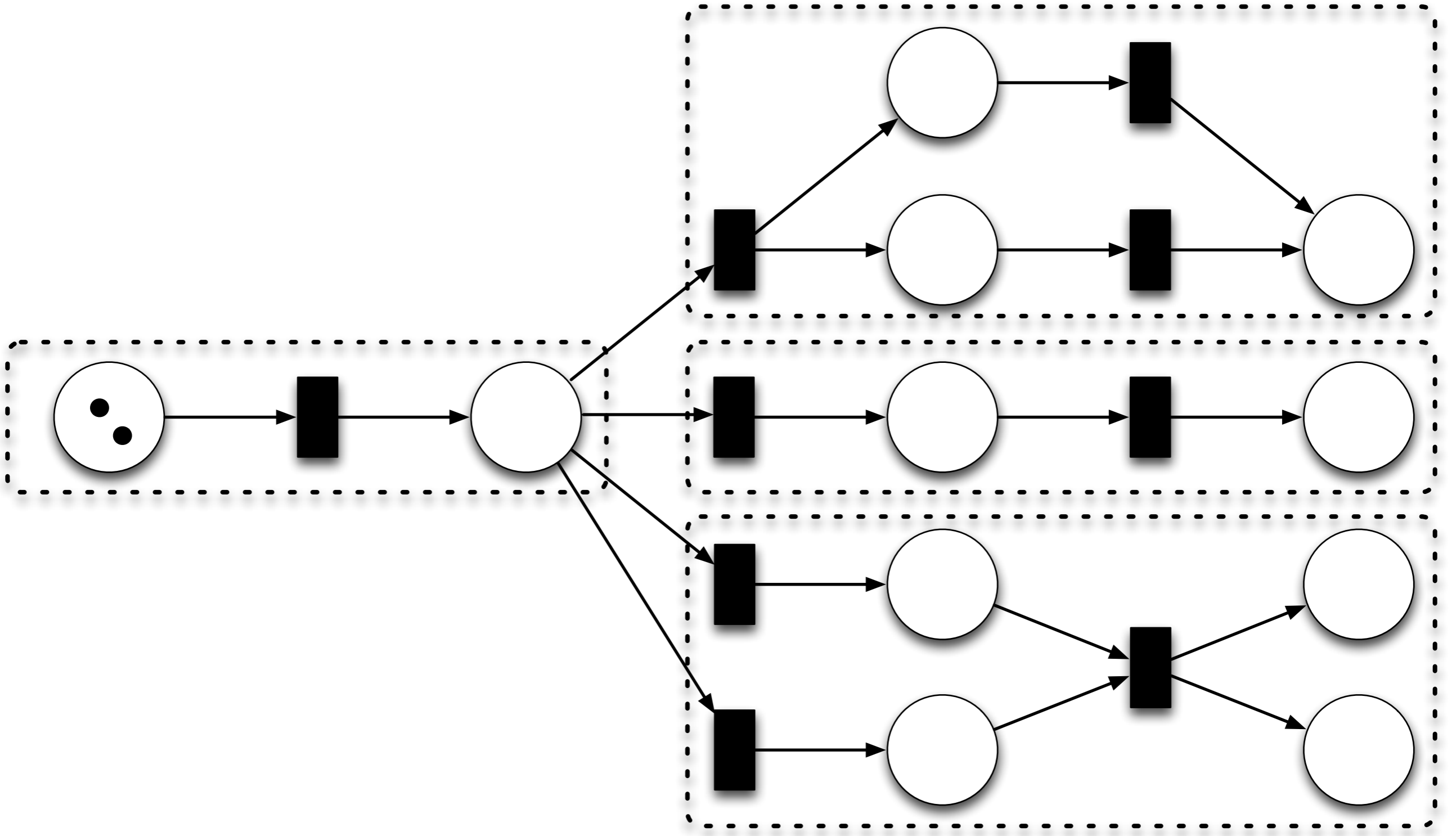
Probabilities

Time

Modularity

Priorities





2) TÂCHES

MAPPING SÉMANTIQUE (MILAN)

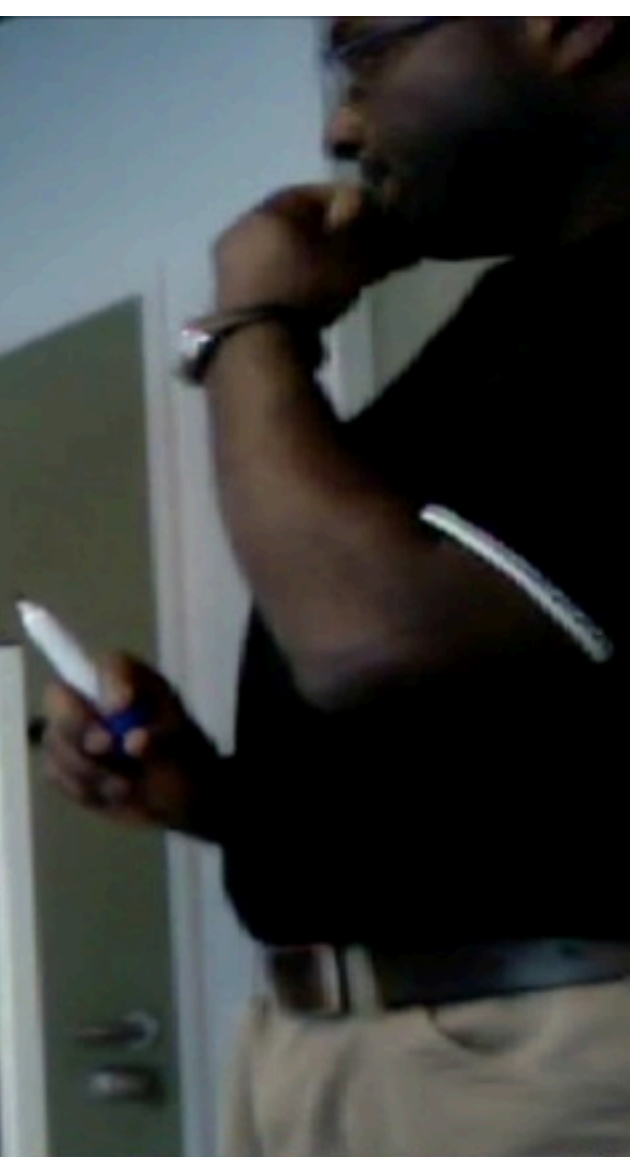
- MODULARITE (Buccho + Petrucci) + TREVES
- TEMPS (Béland + Lime)
- APN (Paréchal + PETRUCCI)
- PRIORITE (Petrucci + Lakos)
- PROBA(?) (François Robert, "Les systèmes d'urgence distribués")

LE MANIÈRE {

- TACHONNEMENT
- POLITIQUE DE ROUTE
- POLITIQUE DE RENDE

 } CORON + LIMAD

SOTA + PROPAL POUR ADAPTABILITE



2) TÂCHES

MAPPING SÉMANTIQUE (MILAN)

MODULARITÉ (Buccho + Petrucci)

- TEMPS (Betand + Lime)
- APN (Paréchal + Petrucci)
- PRIORITÉ (Petrucci + Lakos)
- PROBA(?)

(François Robert, "Les systèmes d'urgence distribués")

LE MANIÈRE

- TRAITEMENT
- POLITIQUE DE ROUTE
- POLITIQUE DE RENDE

COORDON + LIMBARD

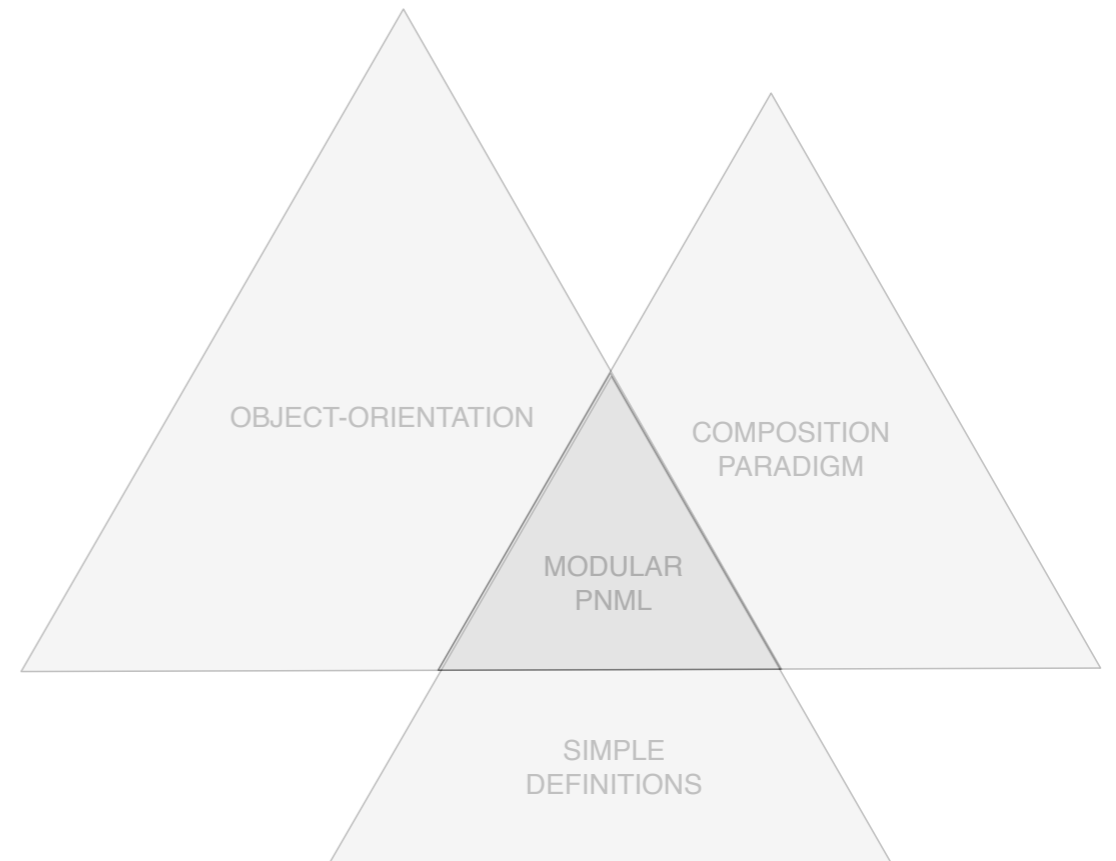
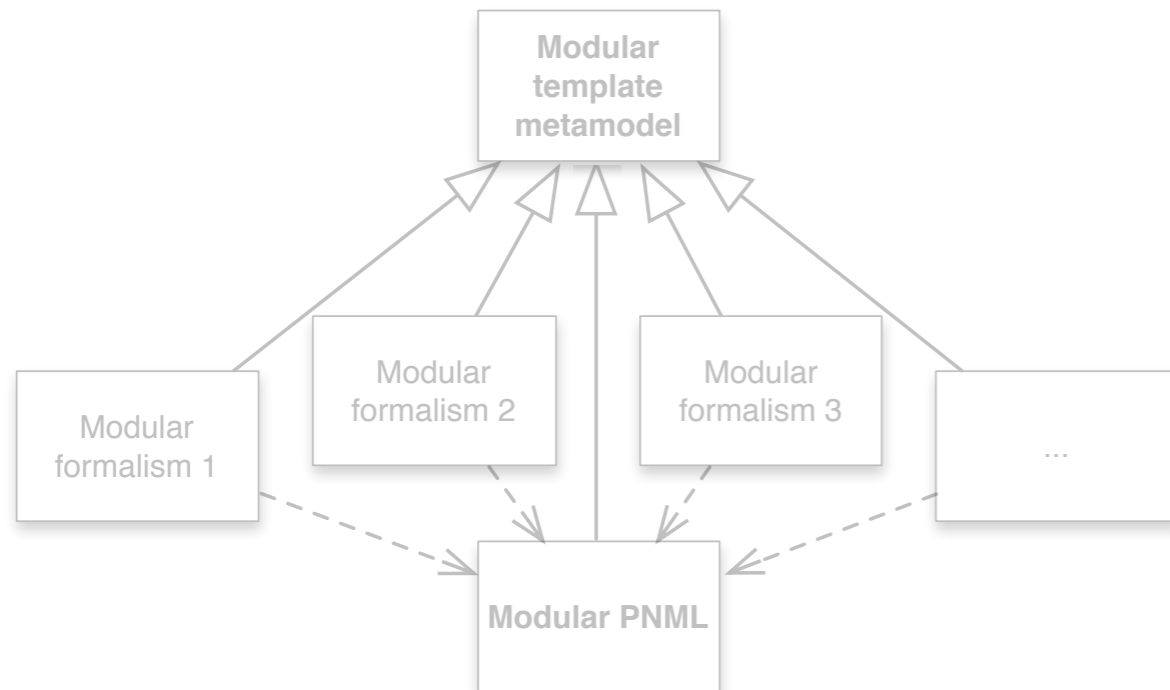
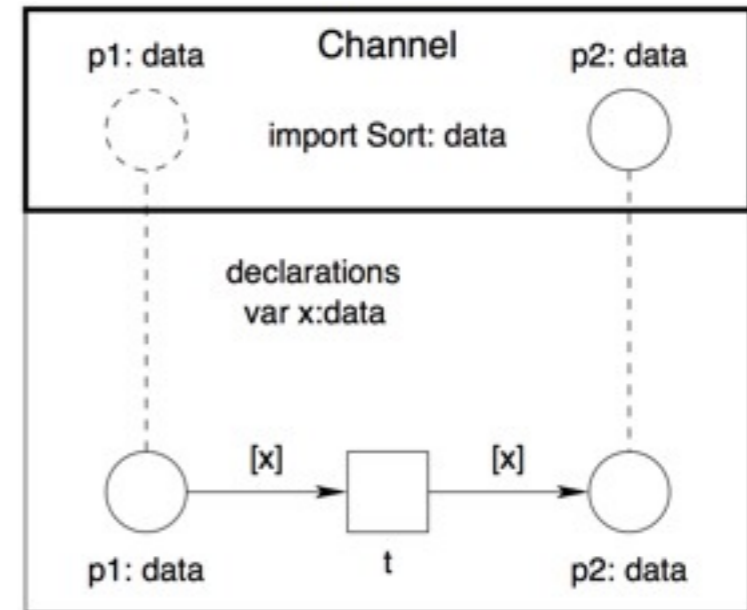
SOTA + PROPAL POUR ADAPTABILITÉ



Outline

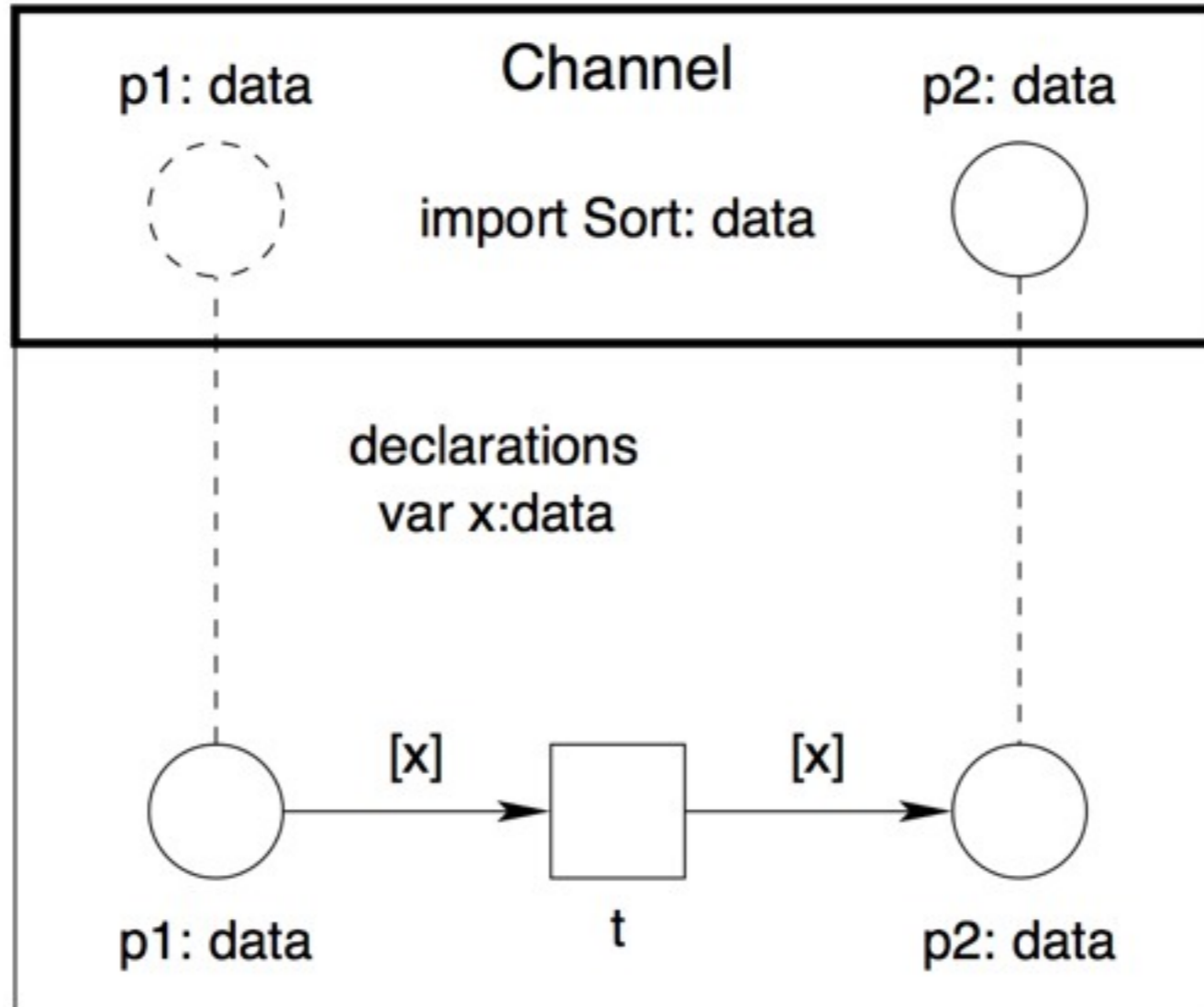


Scope

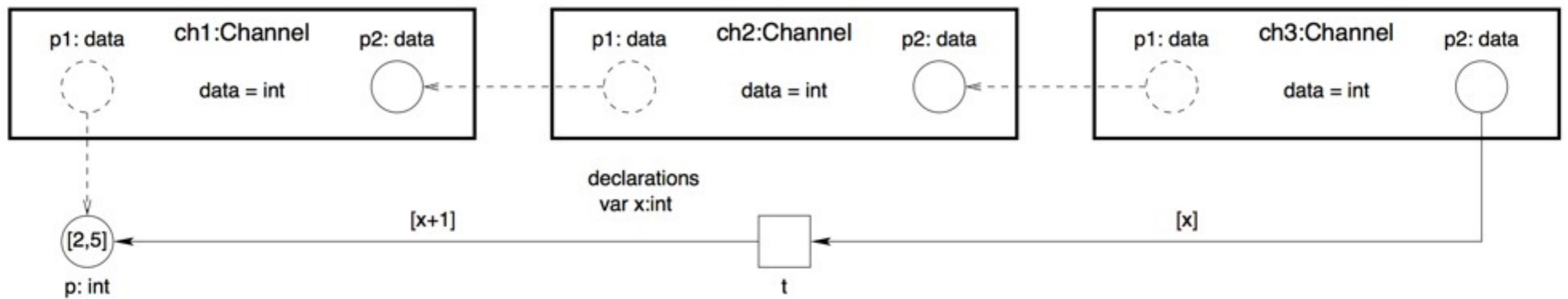


Modular PNML

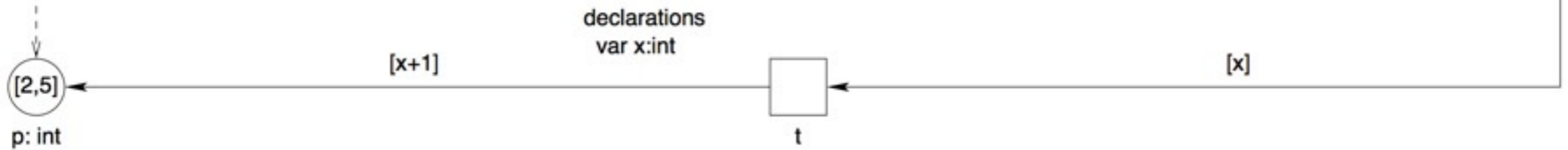
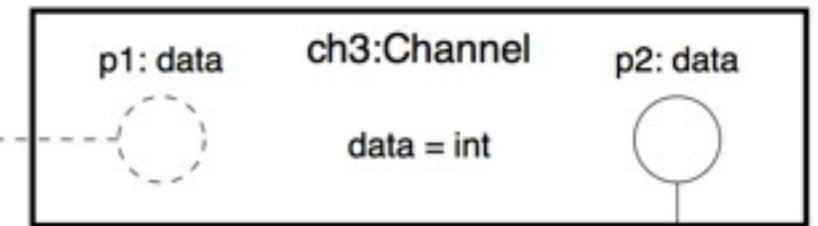
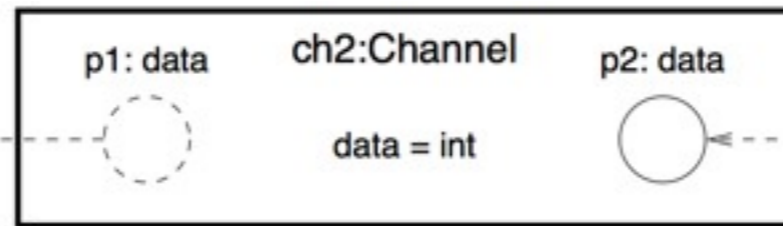
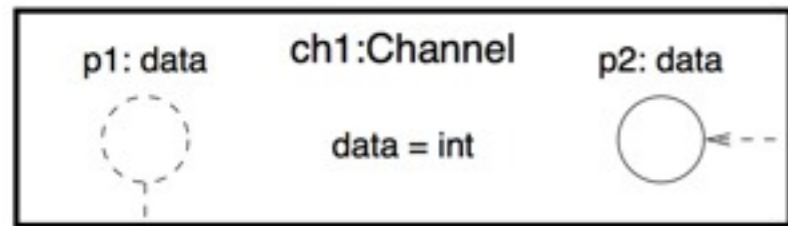
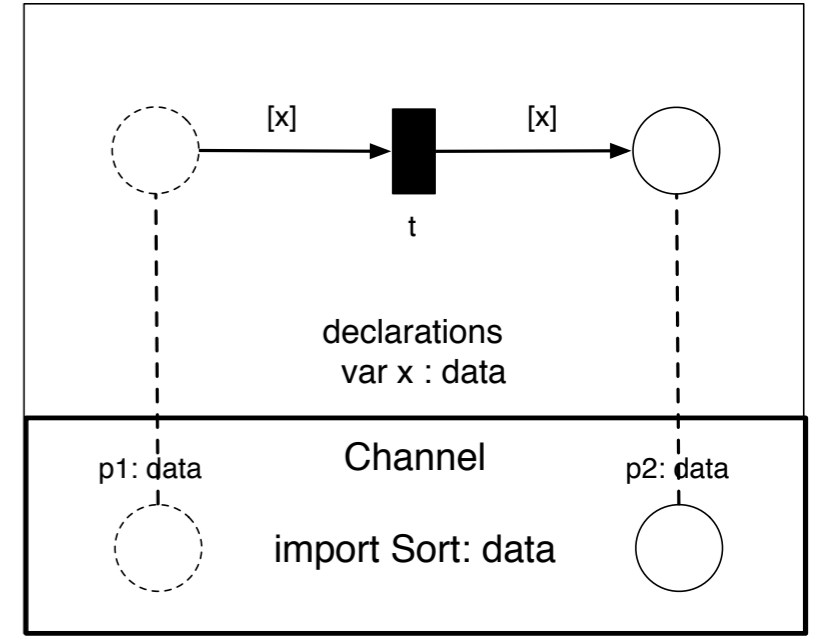
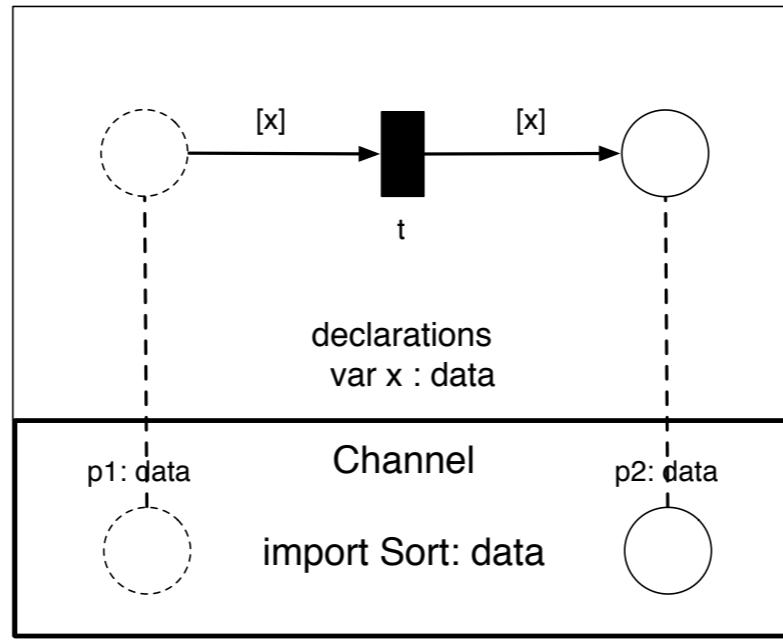
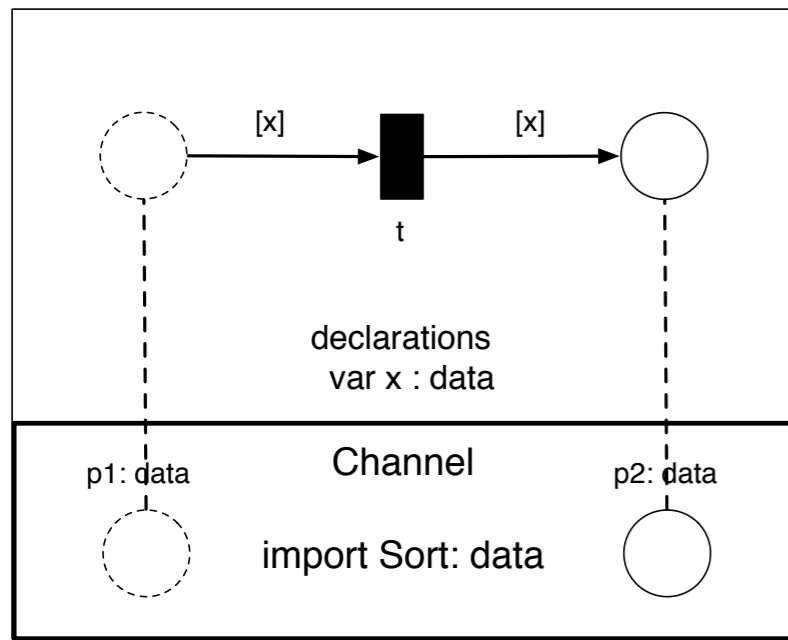
Kindler, Petrucci, 2009,
Towards a Standard for Modular Petri Nets: A Formalisation



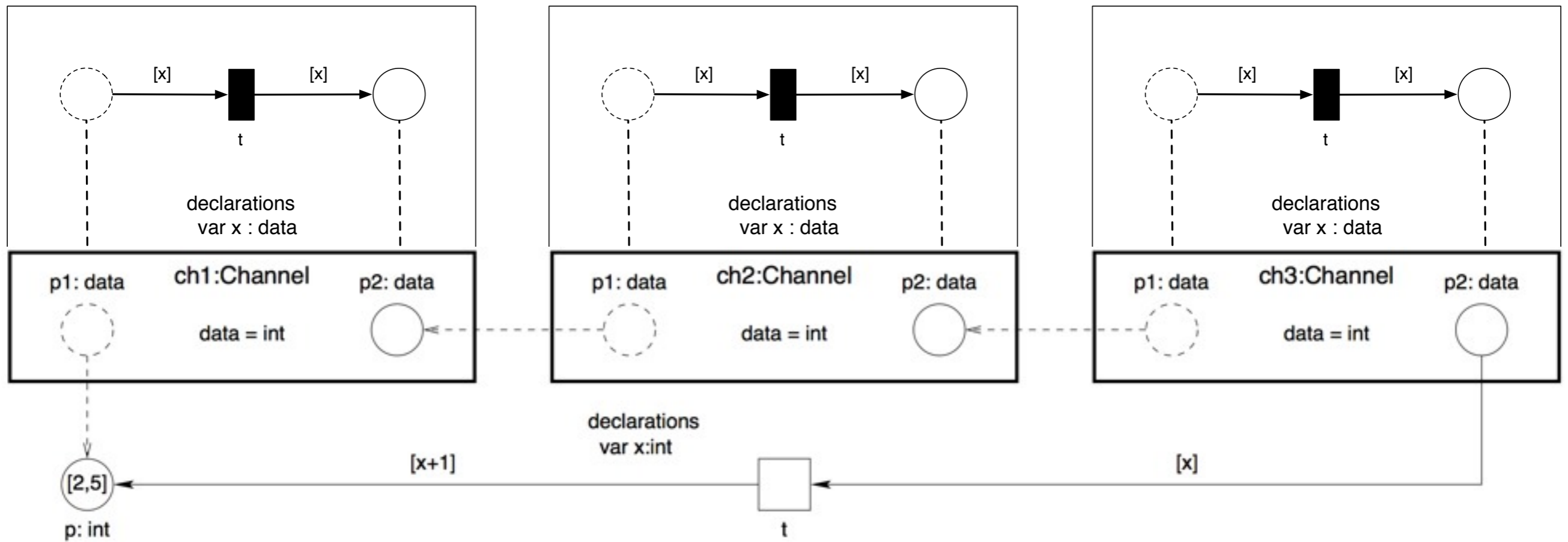
★ Image taken from the original article



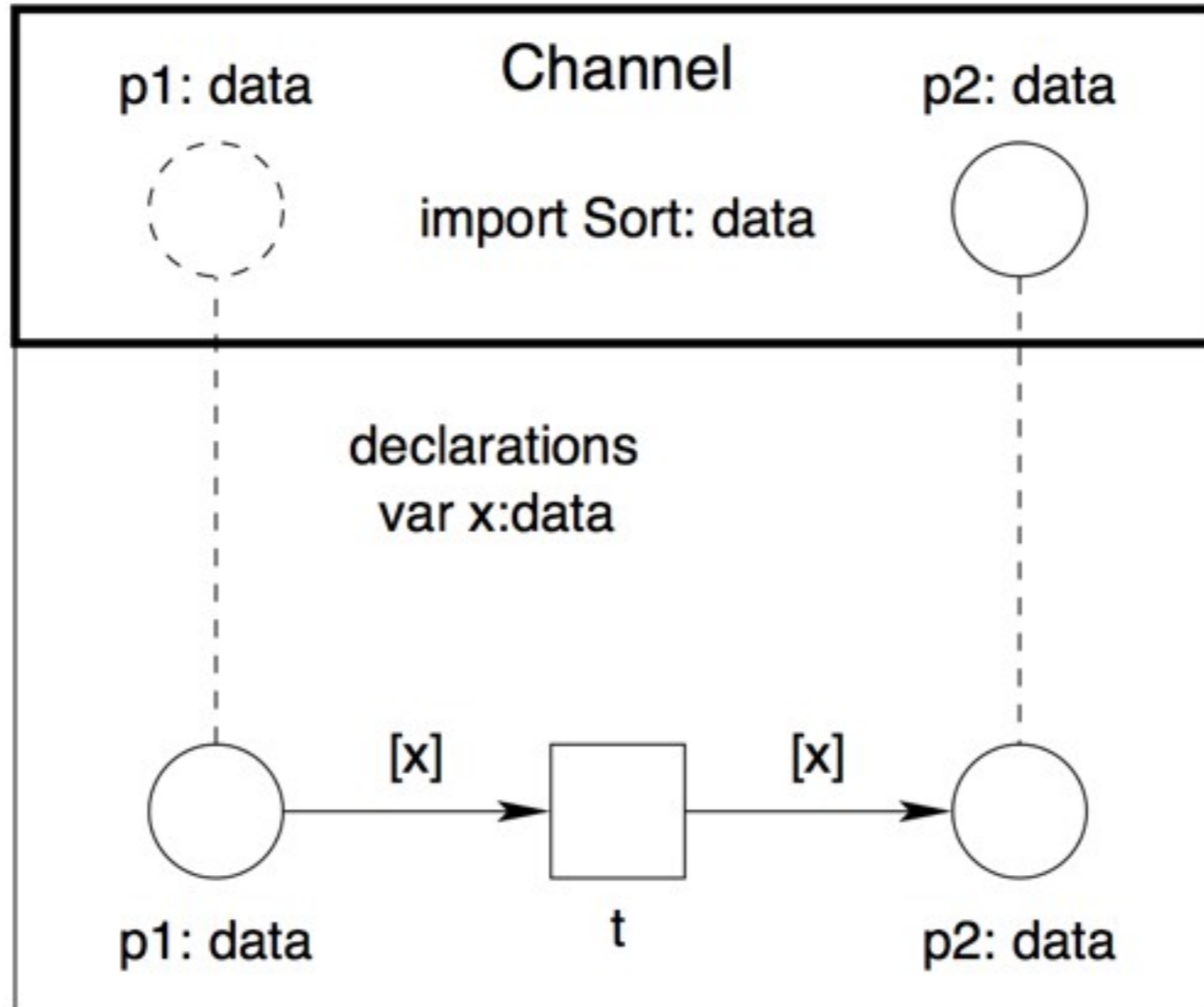
★ Kindler, Petrucci, 2009,
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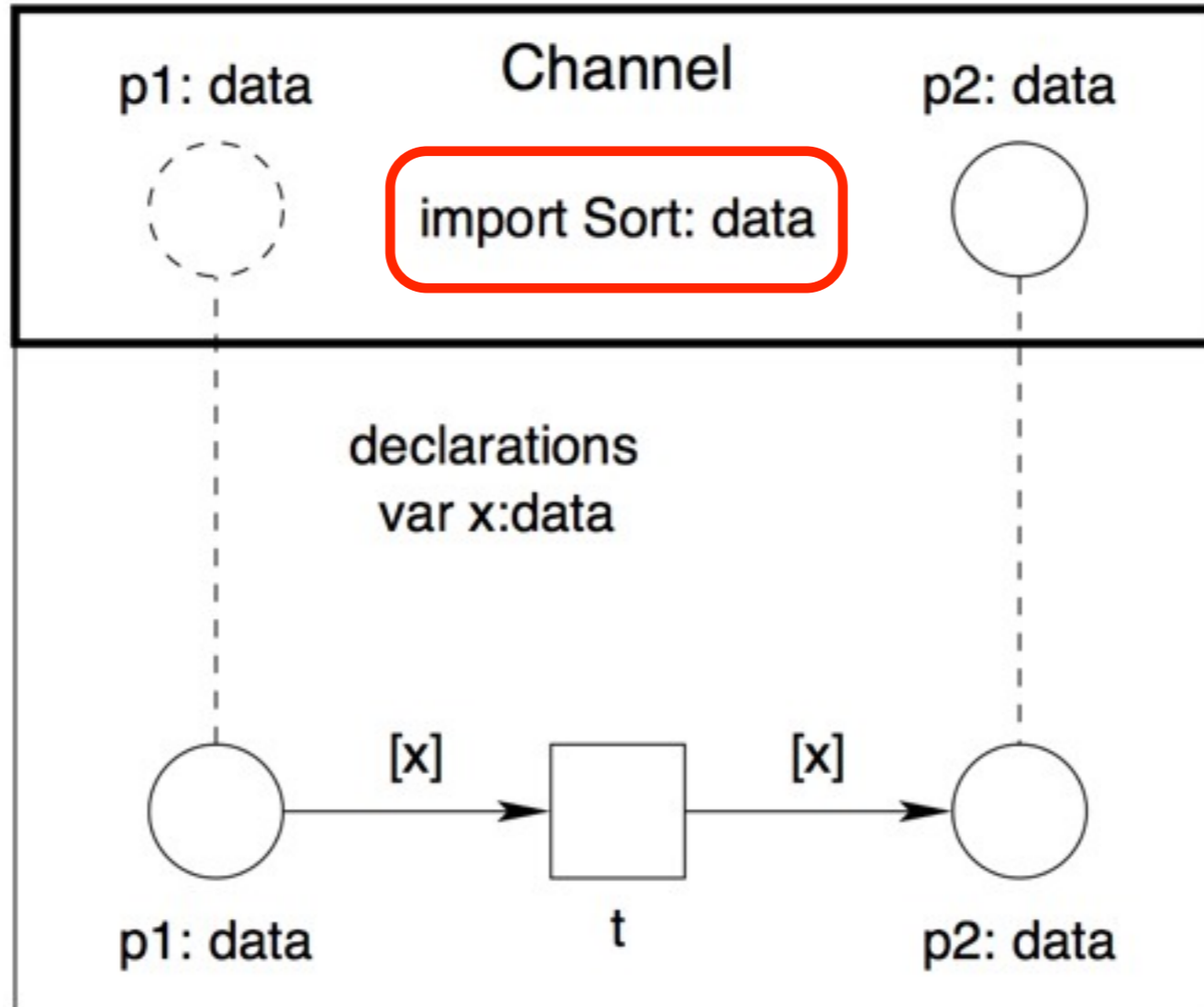
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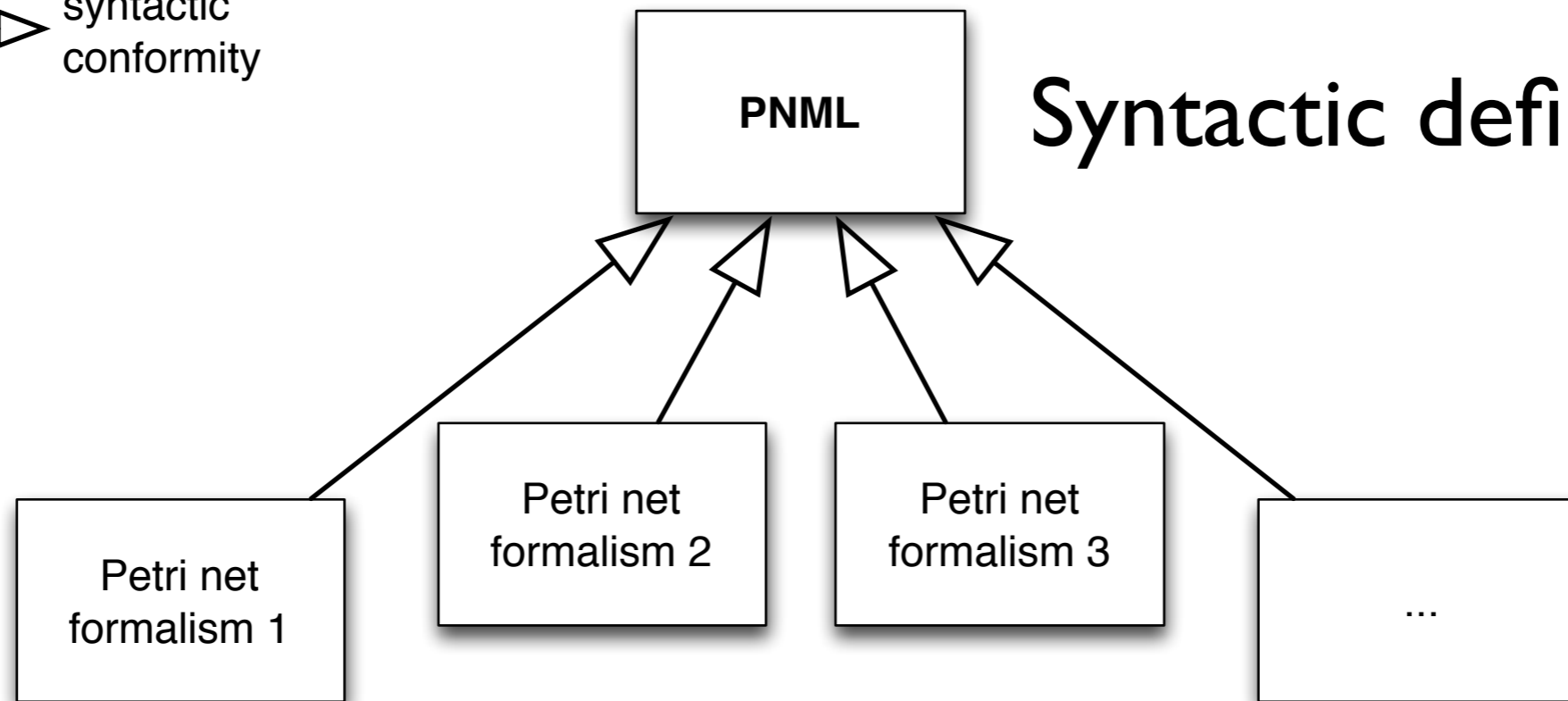
Kindler, Petrucci, 2009,
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★ Image taken from the original article



→ syntactic conformity



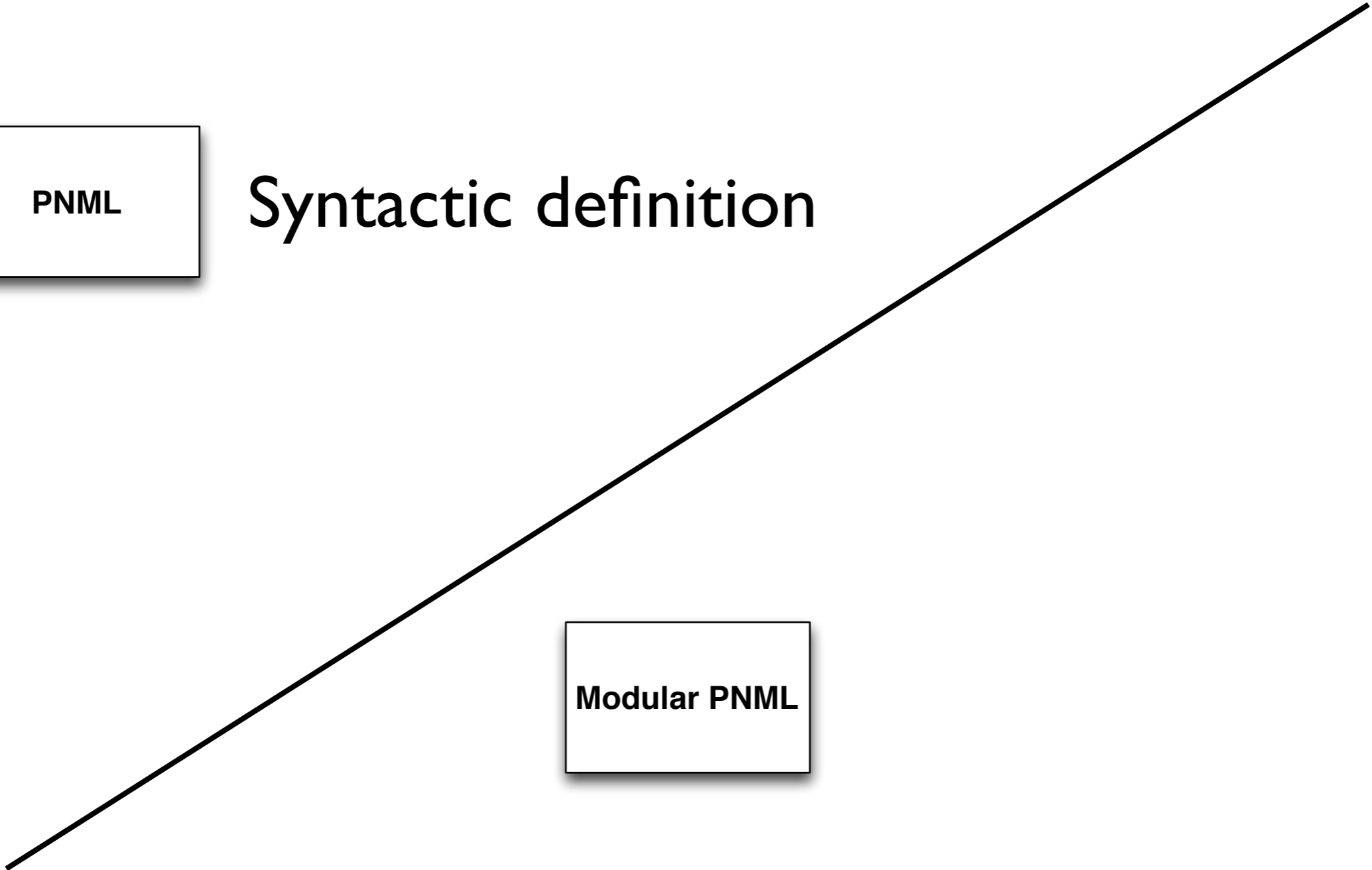
PNML

Syntactic definition

PNML

Syntactic definition

Modular PNML

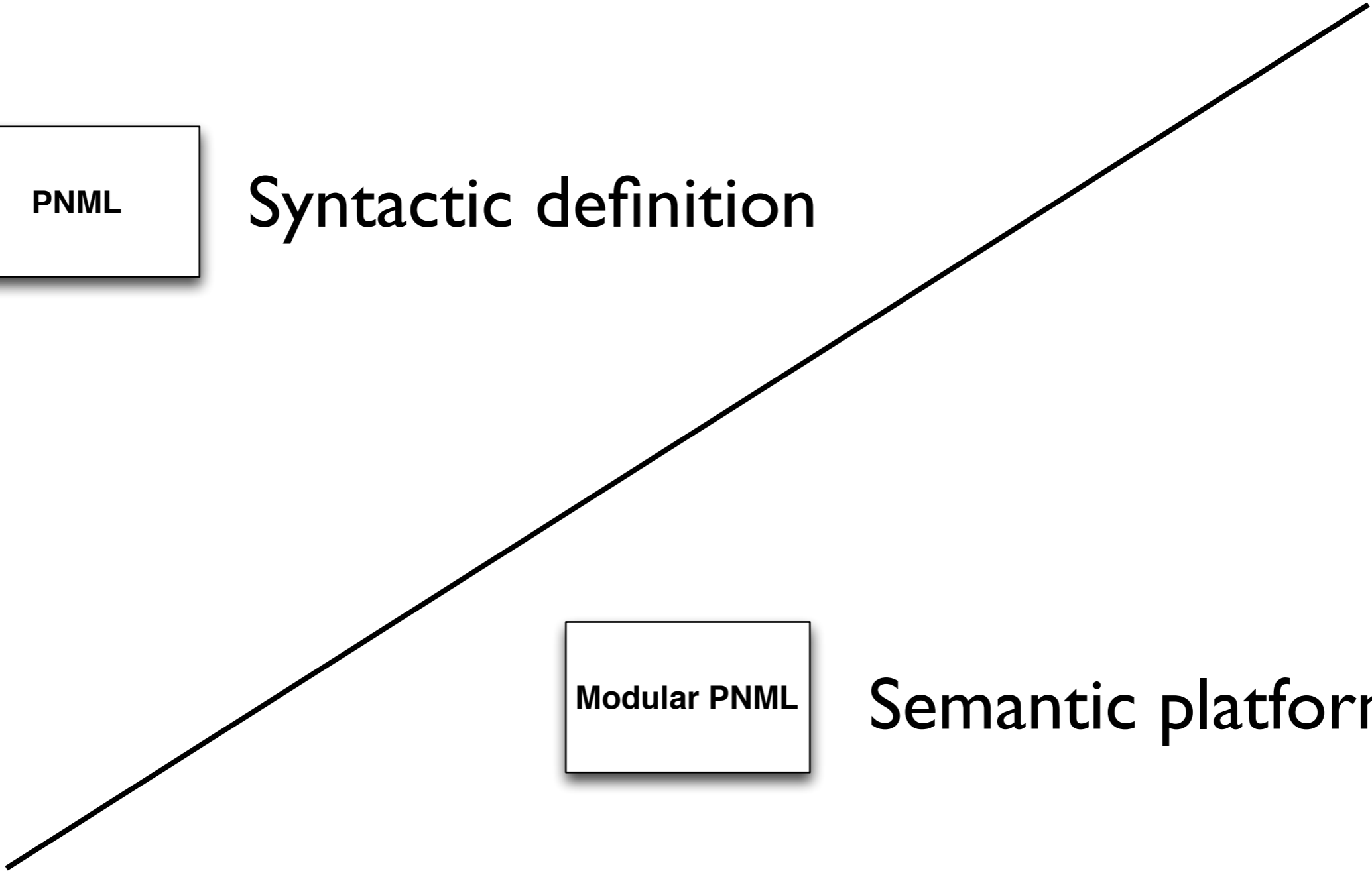


PNML

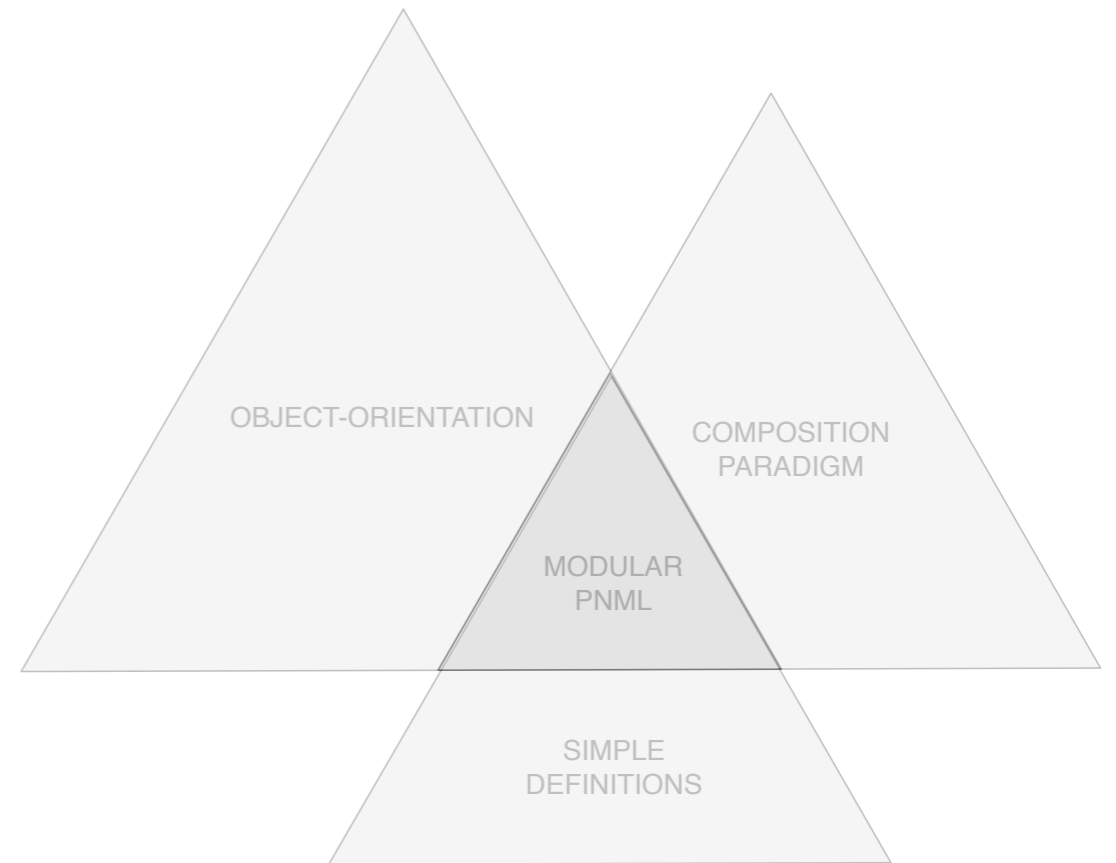
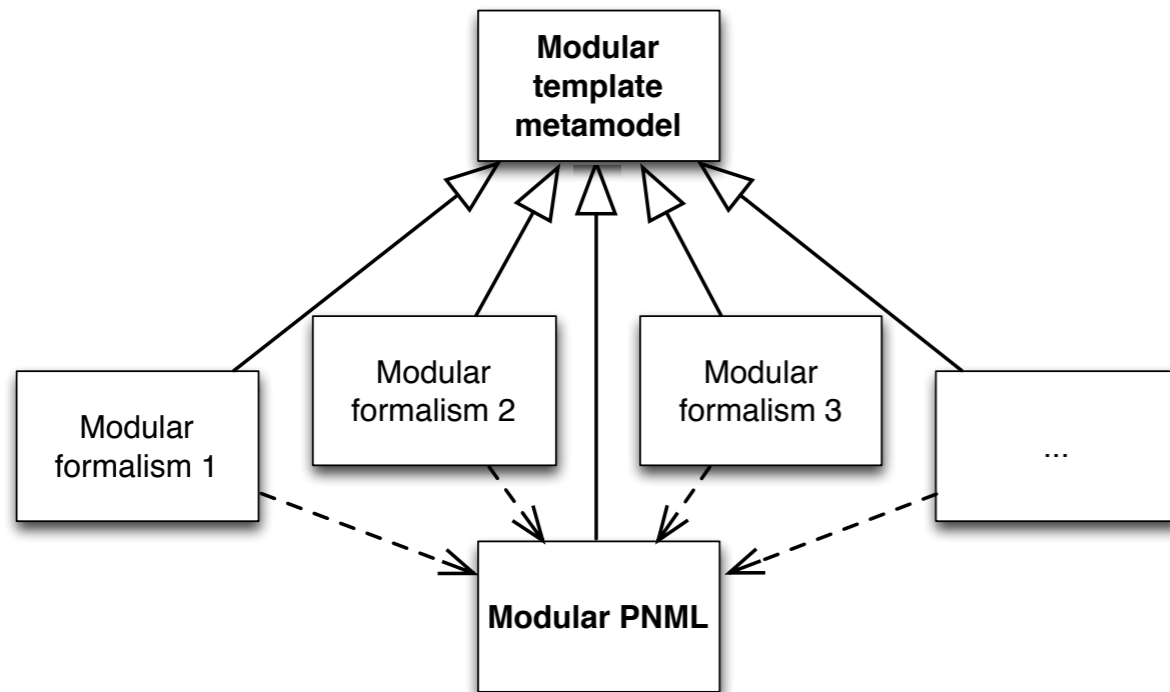
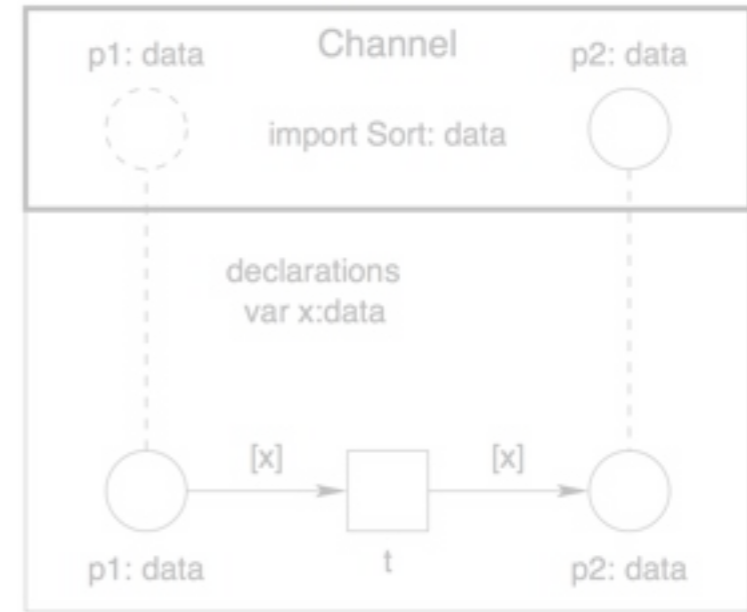
Syntactic definition

Modular PNML

Semantic platform



Outline



Methodology

Modular PNML

Semantic platform

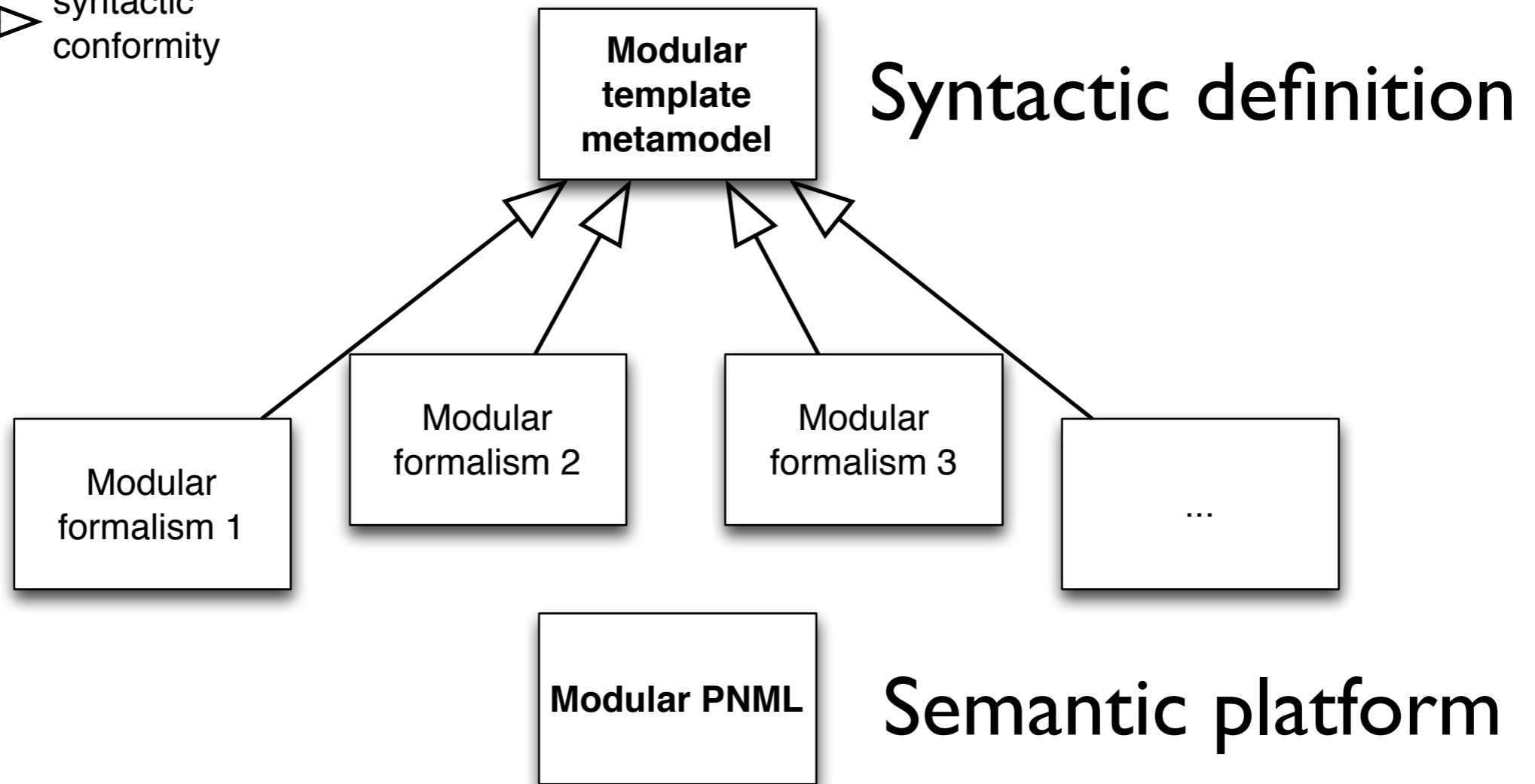
**Modular
template
metamodel**

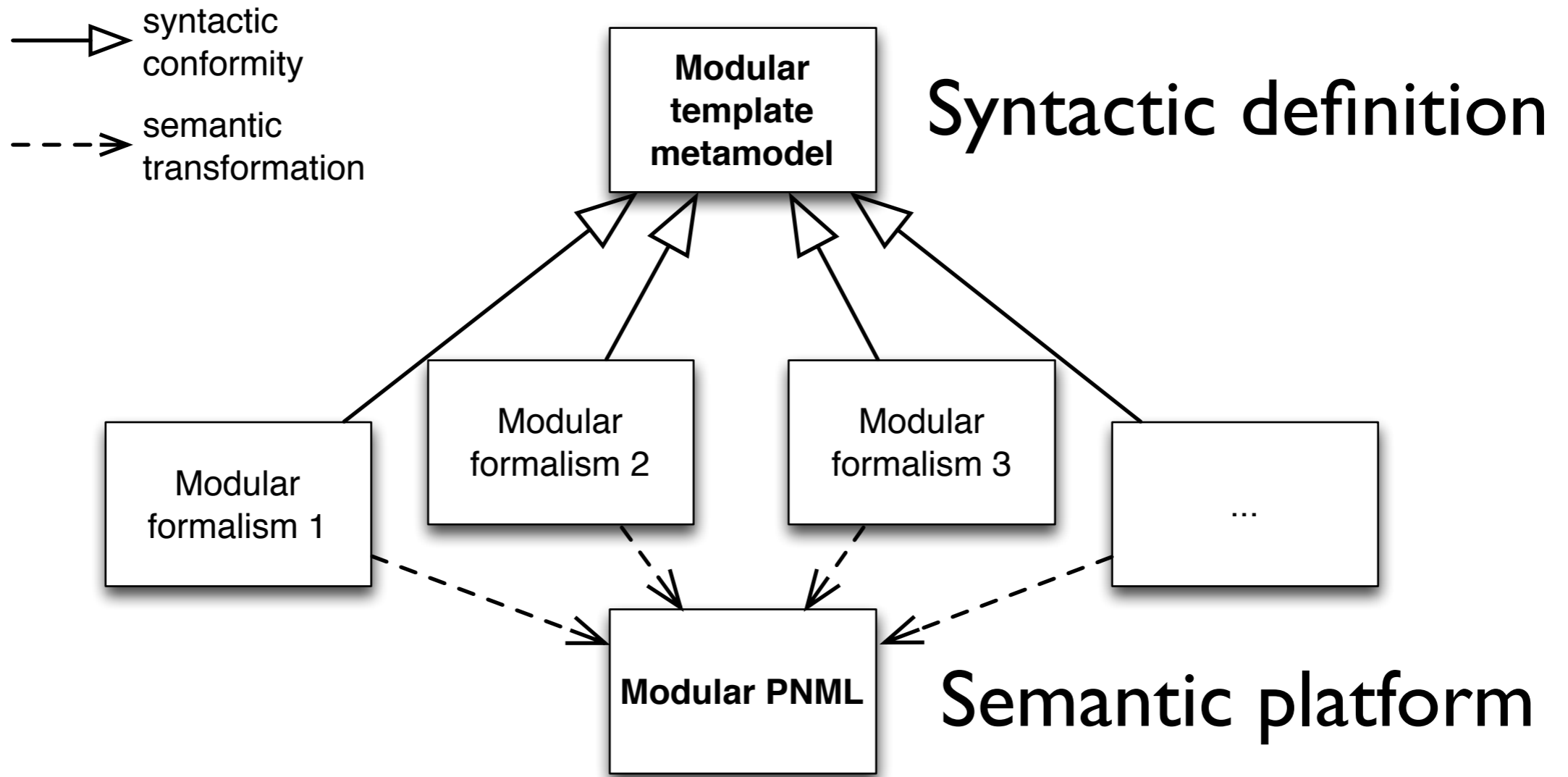
Syntactic definition

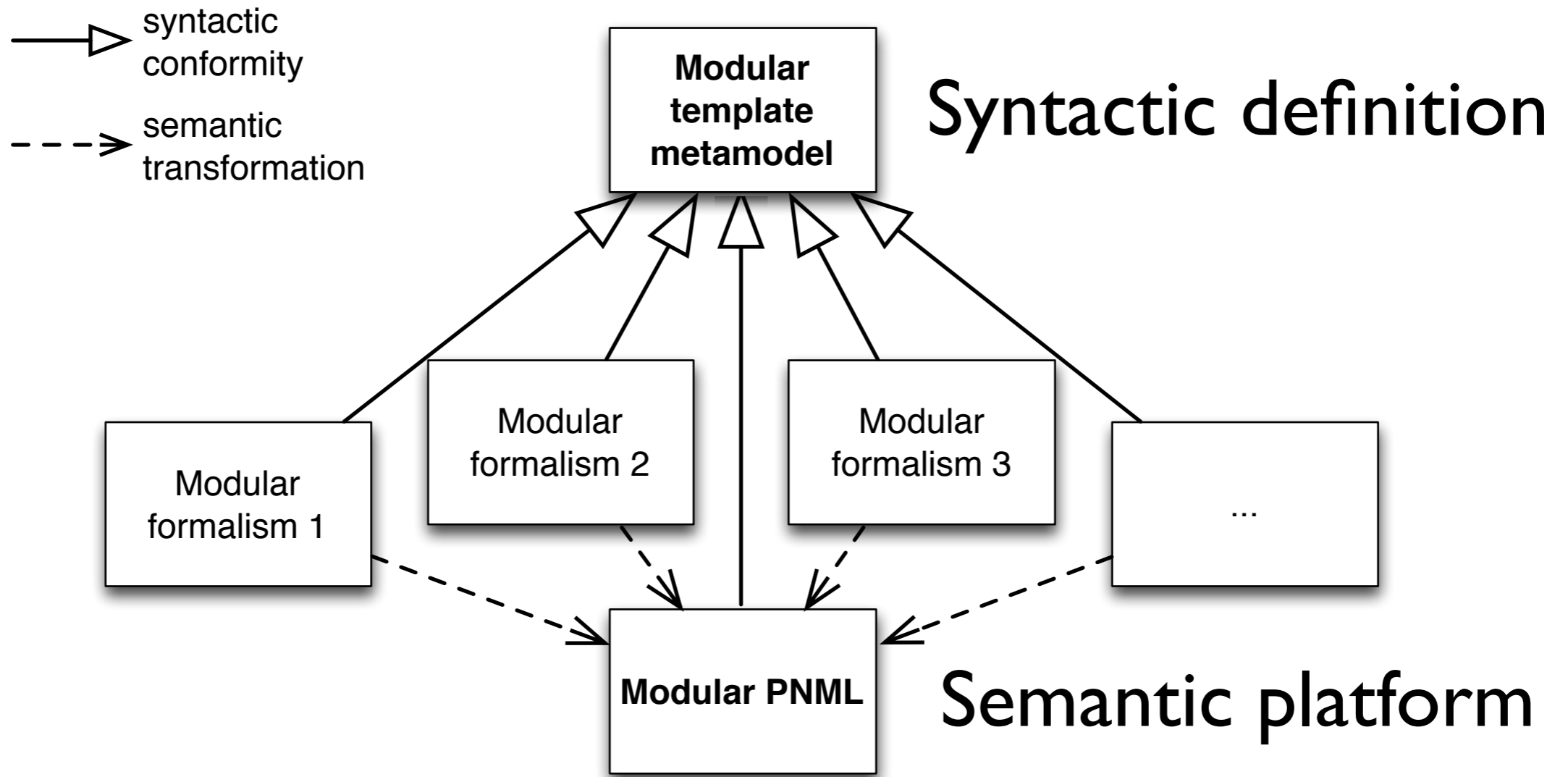
Modular PNML

Semantic platform

→ syntactic conformity







Markup language

Markup language

Unified definition
process

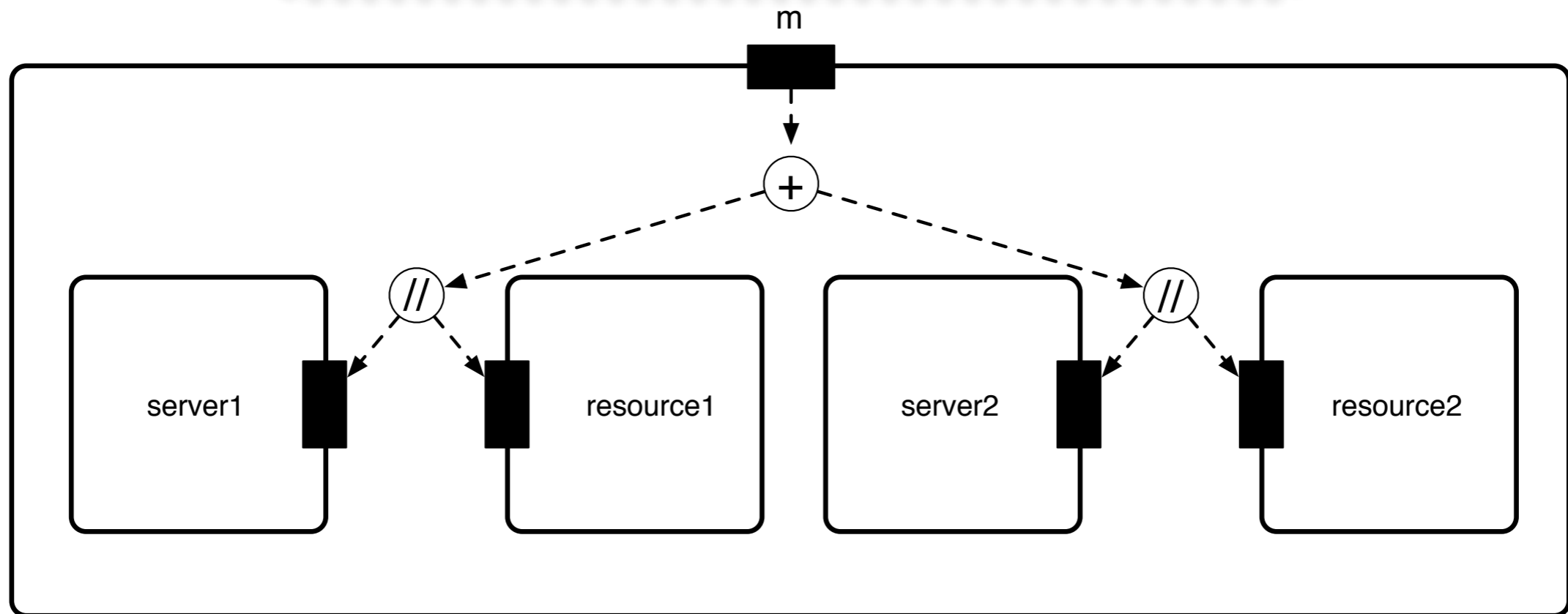
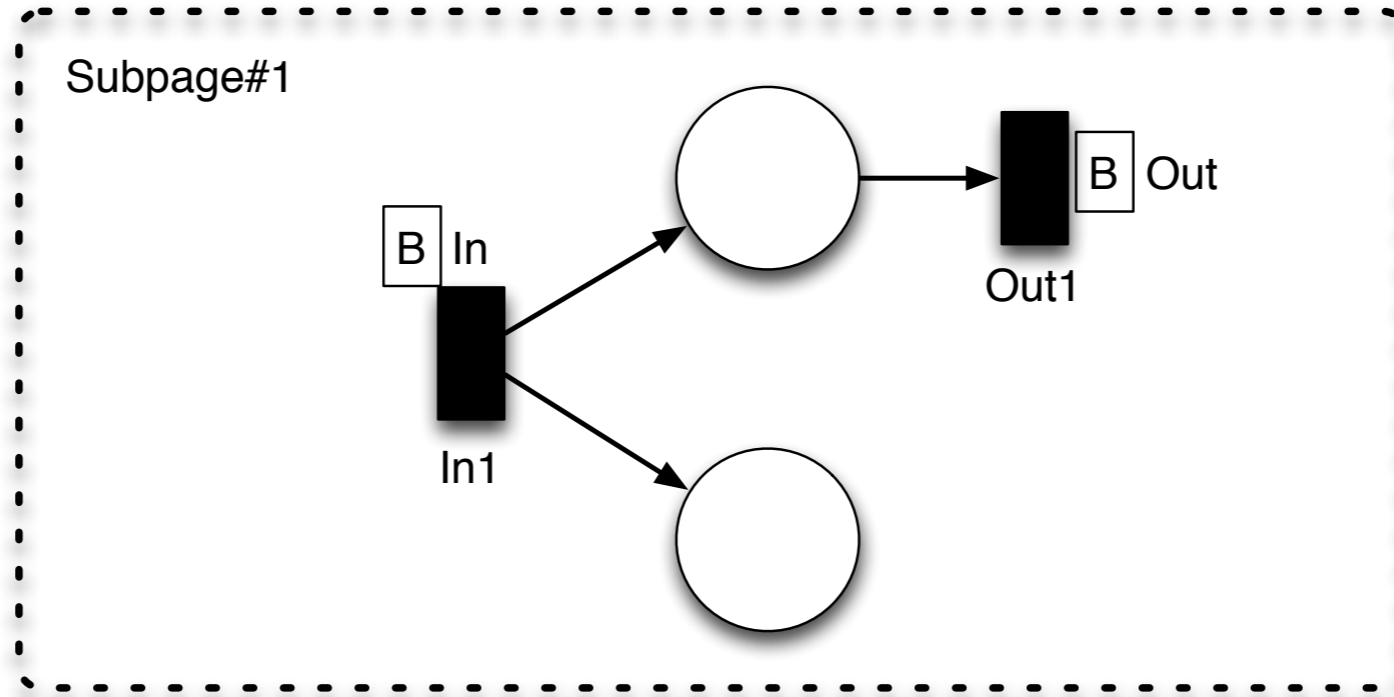
Markup language

**Unified definition
process**

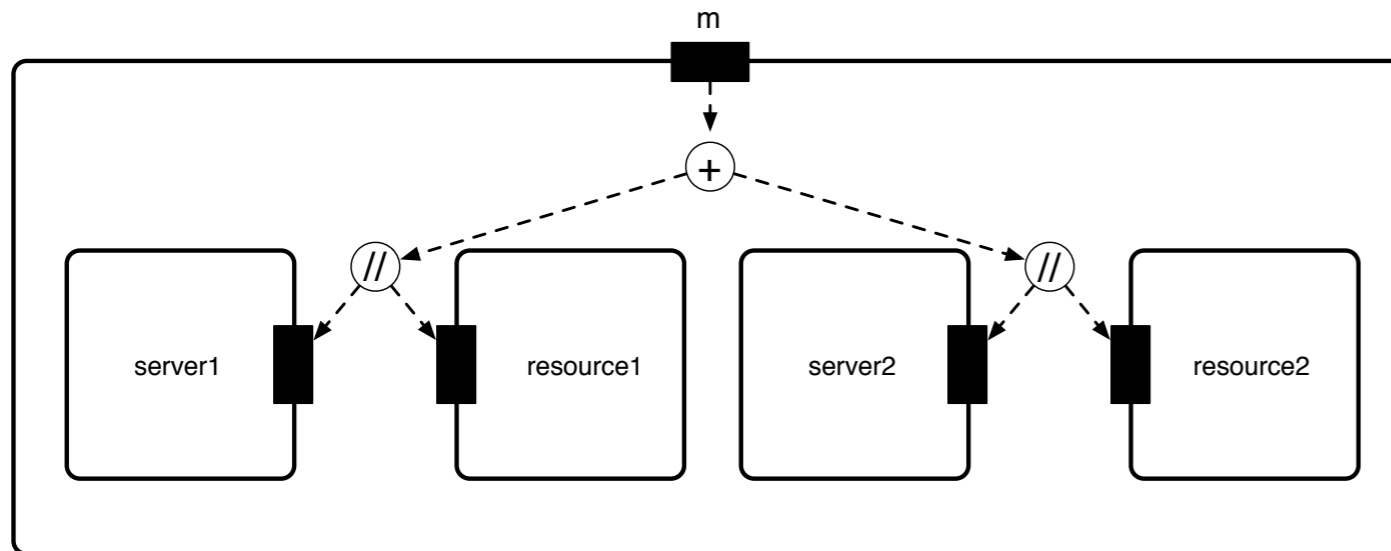
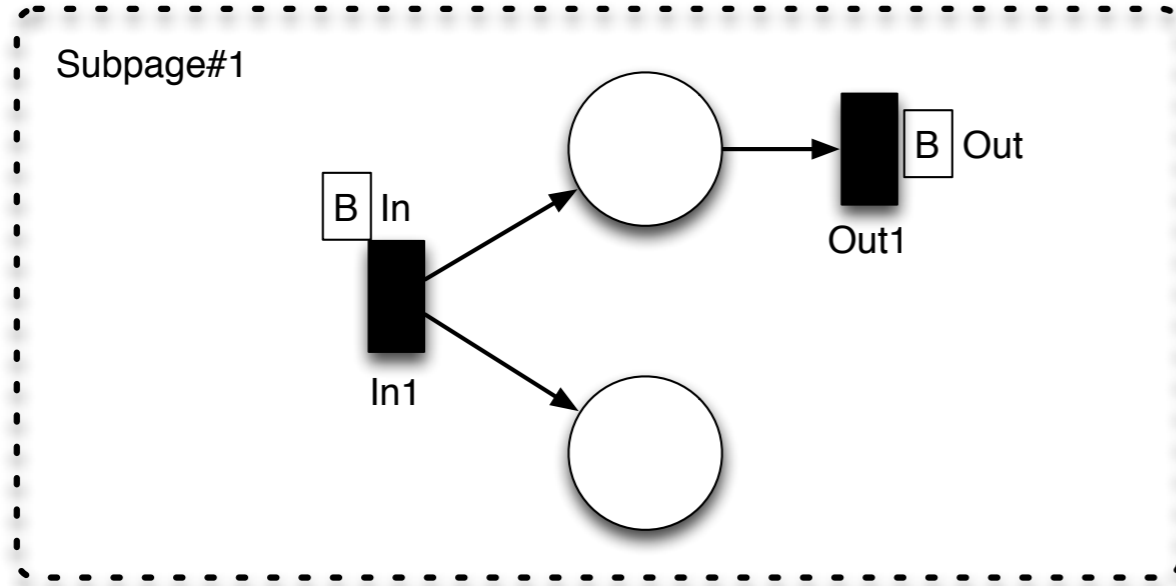
**Inter-formalisms
composition**

Inter-formalisms composition

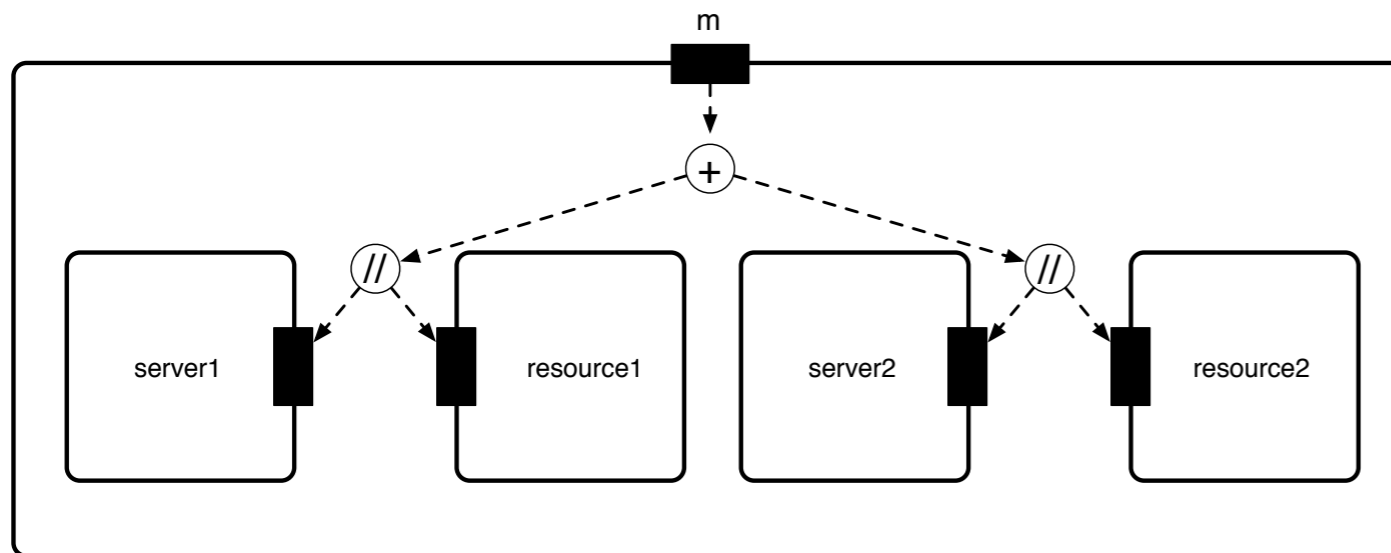
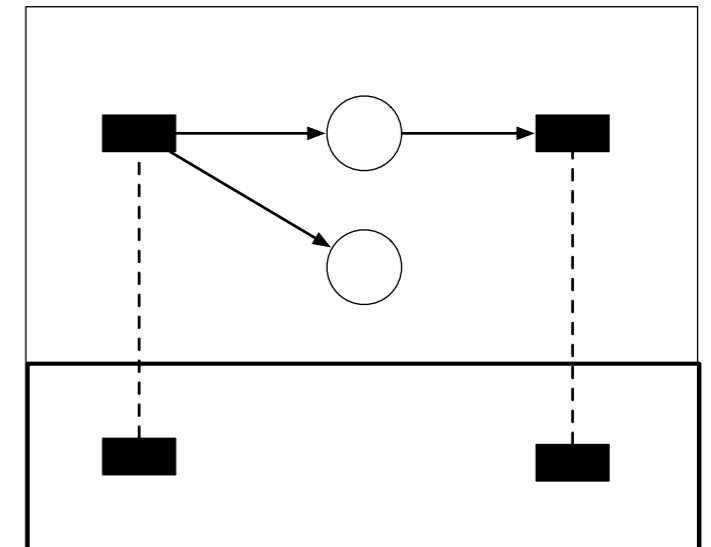
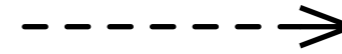
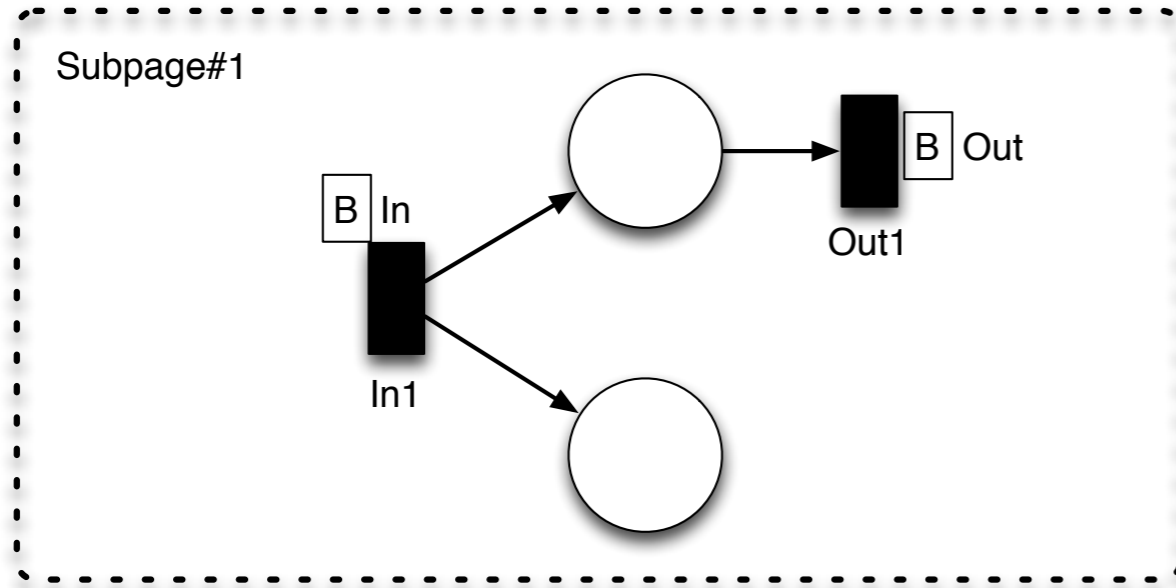
Inter-formalisms composition



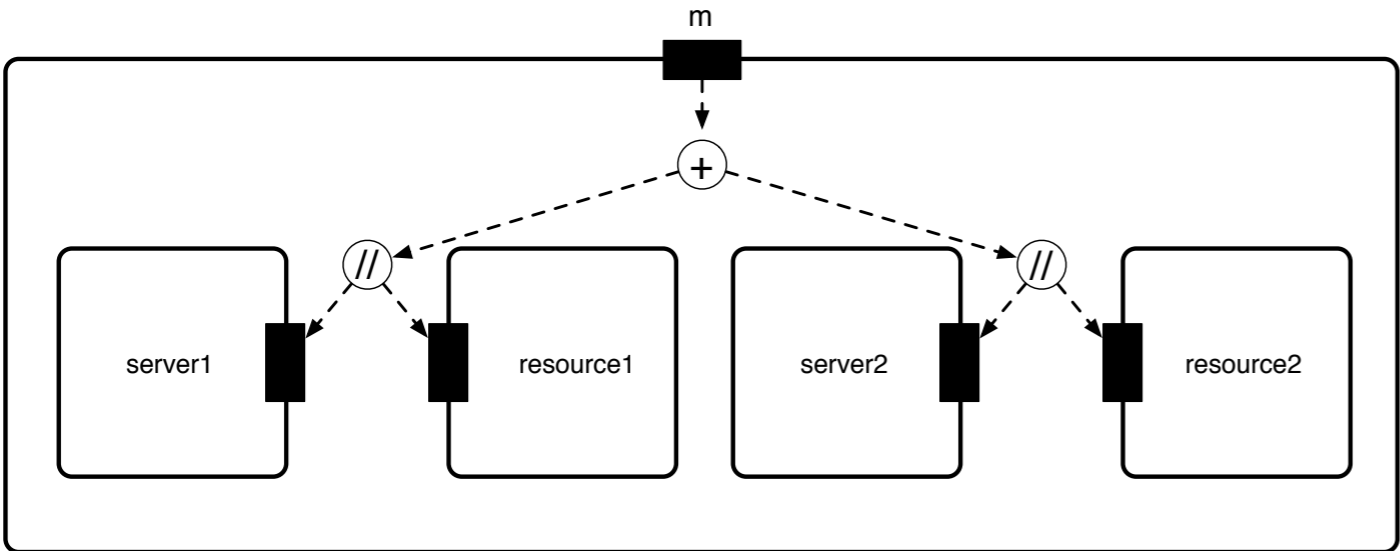
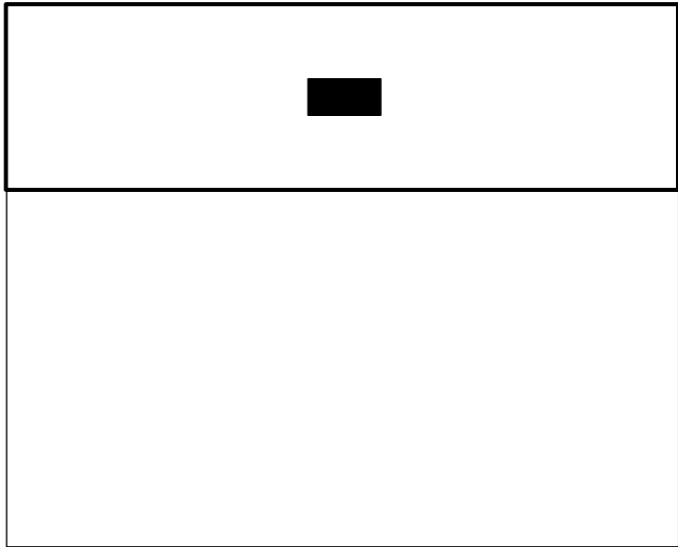
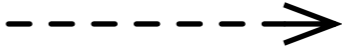
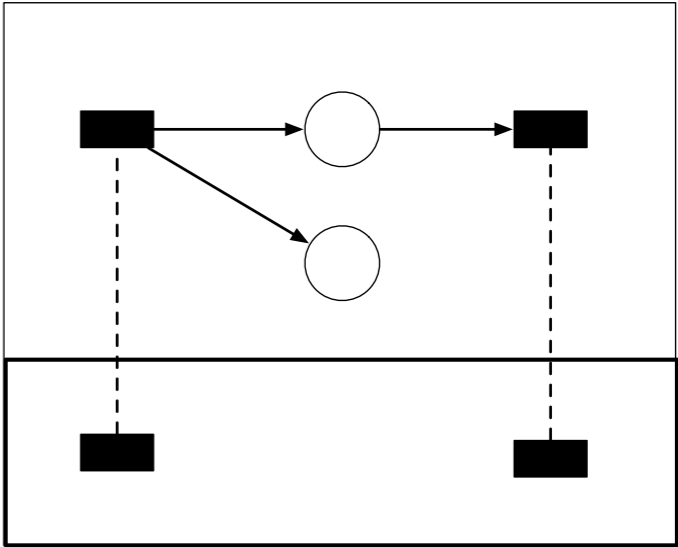
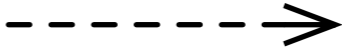
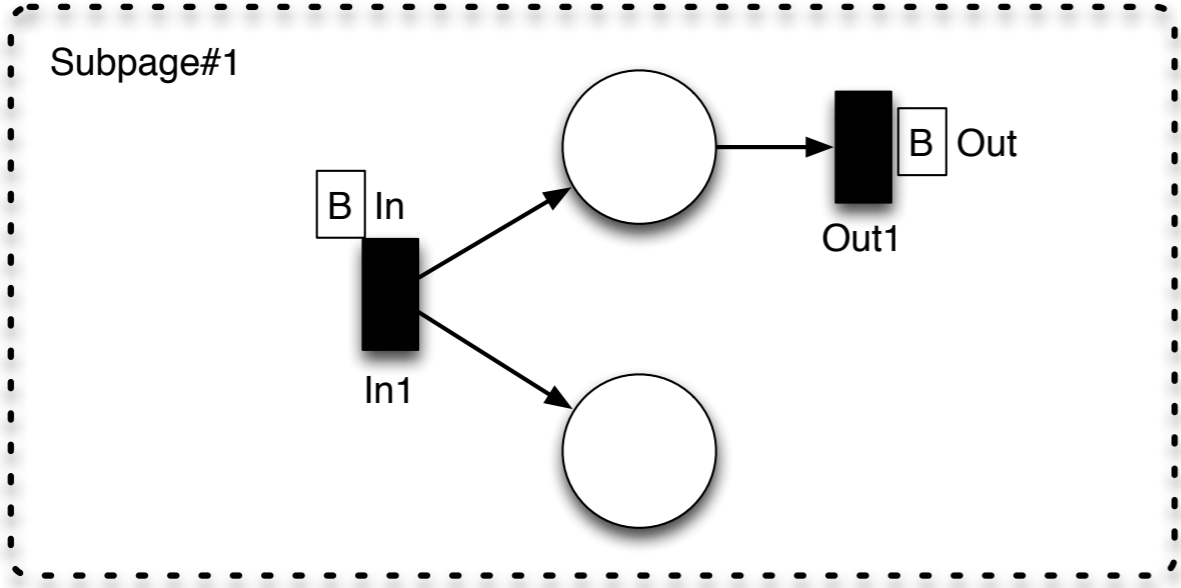
Inter-formalisms composition



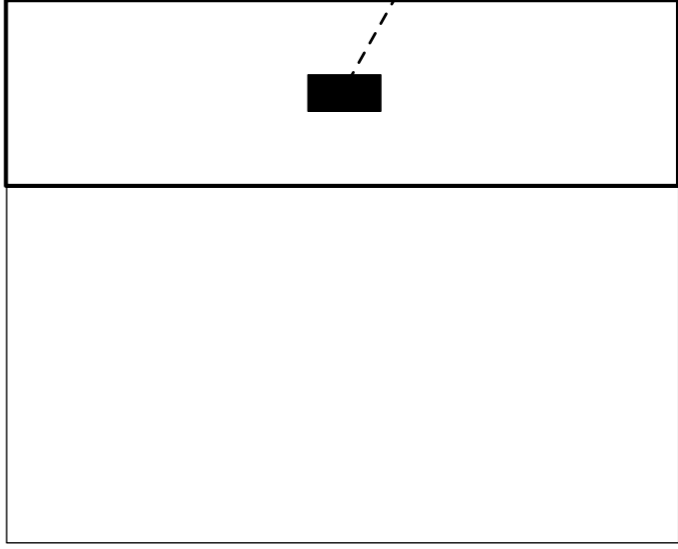
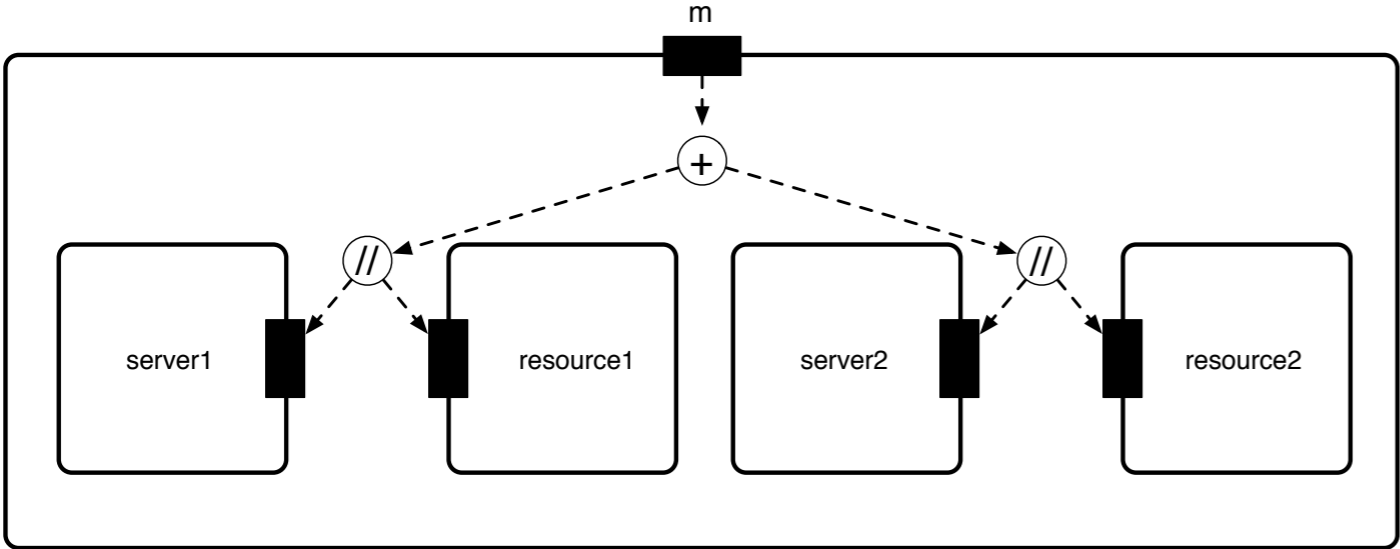
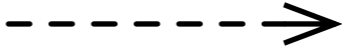
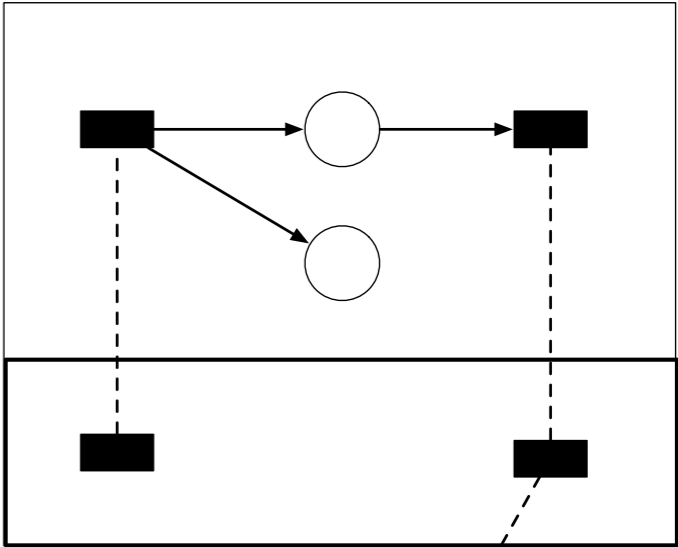
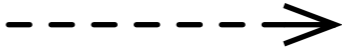
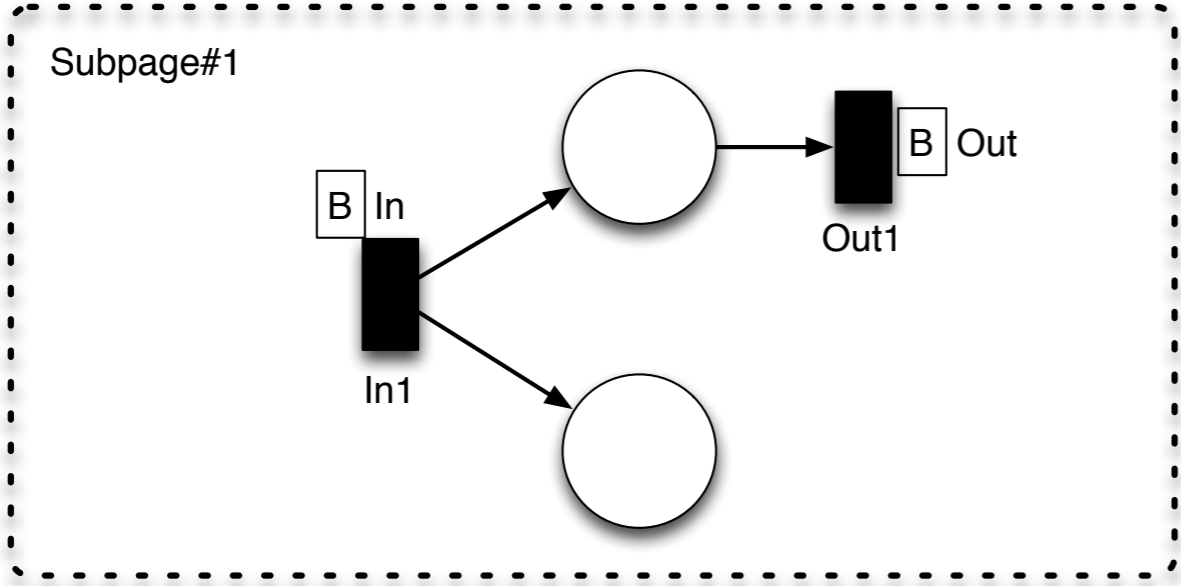
Inter-formalisms composition



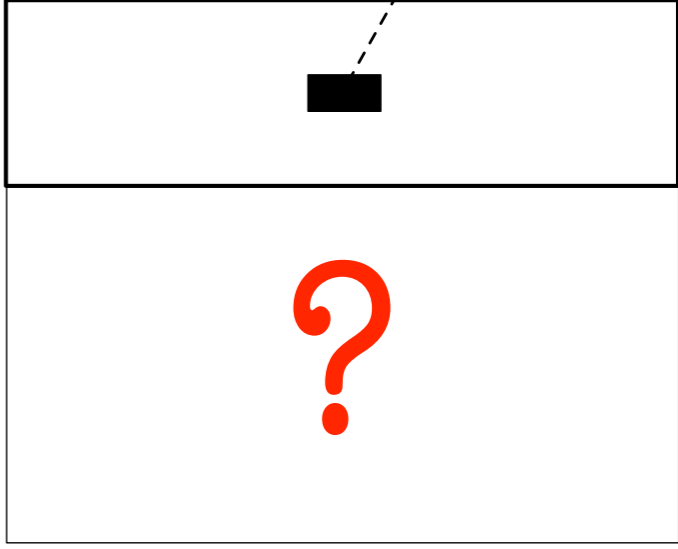
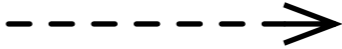
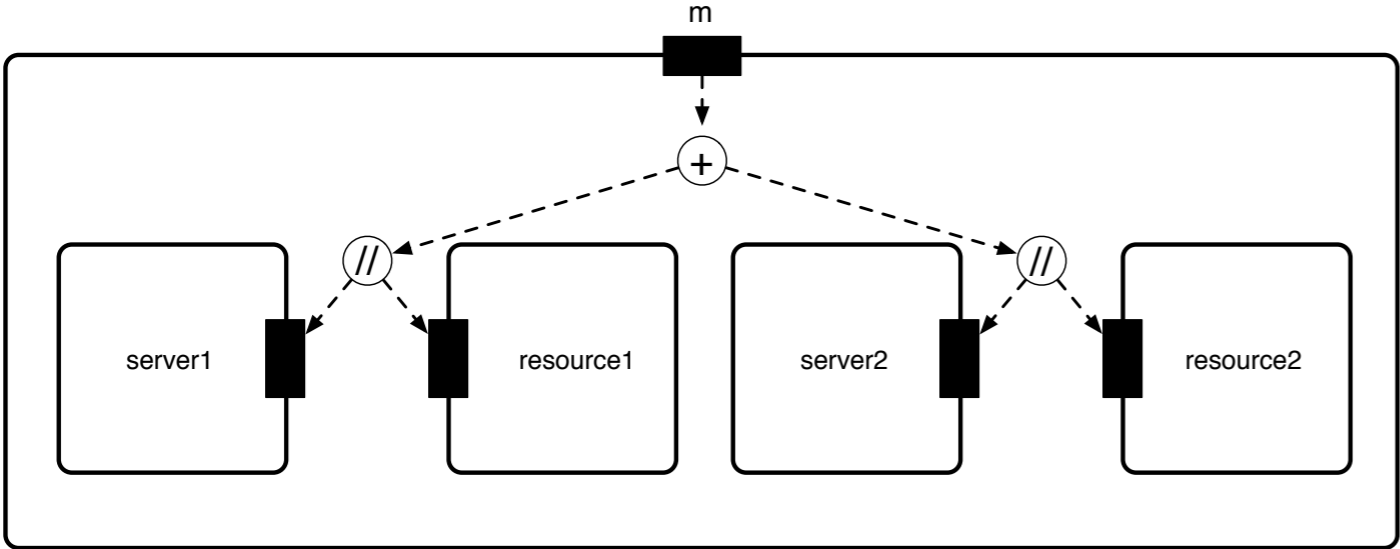
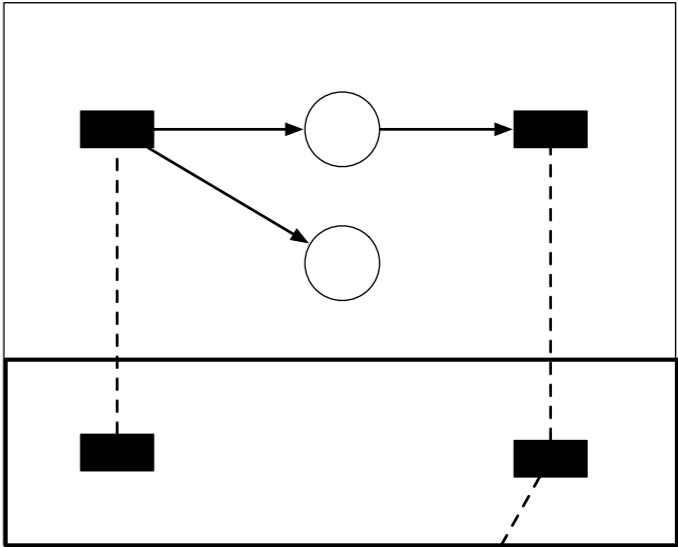
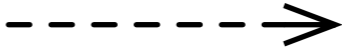
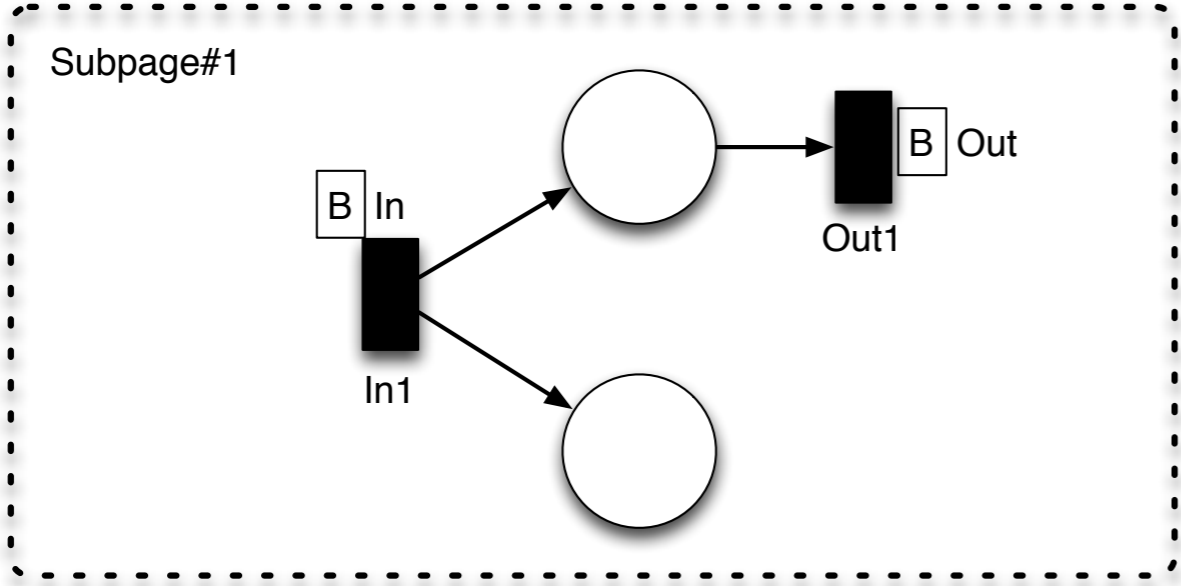
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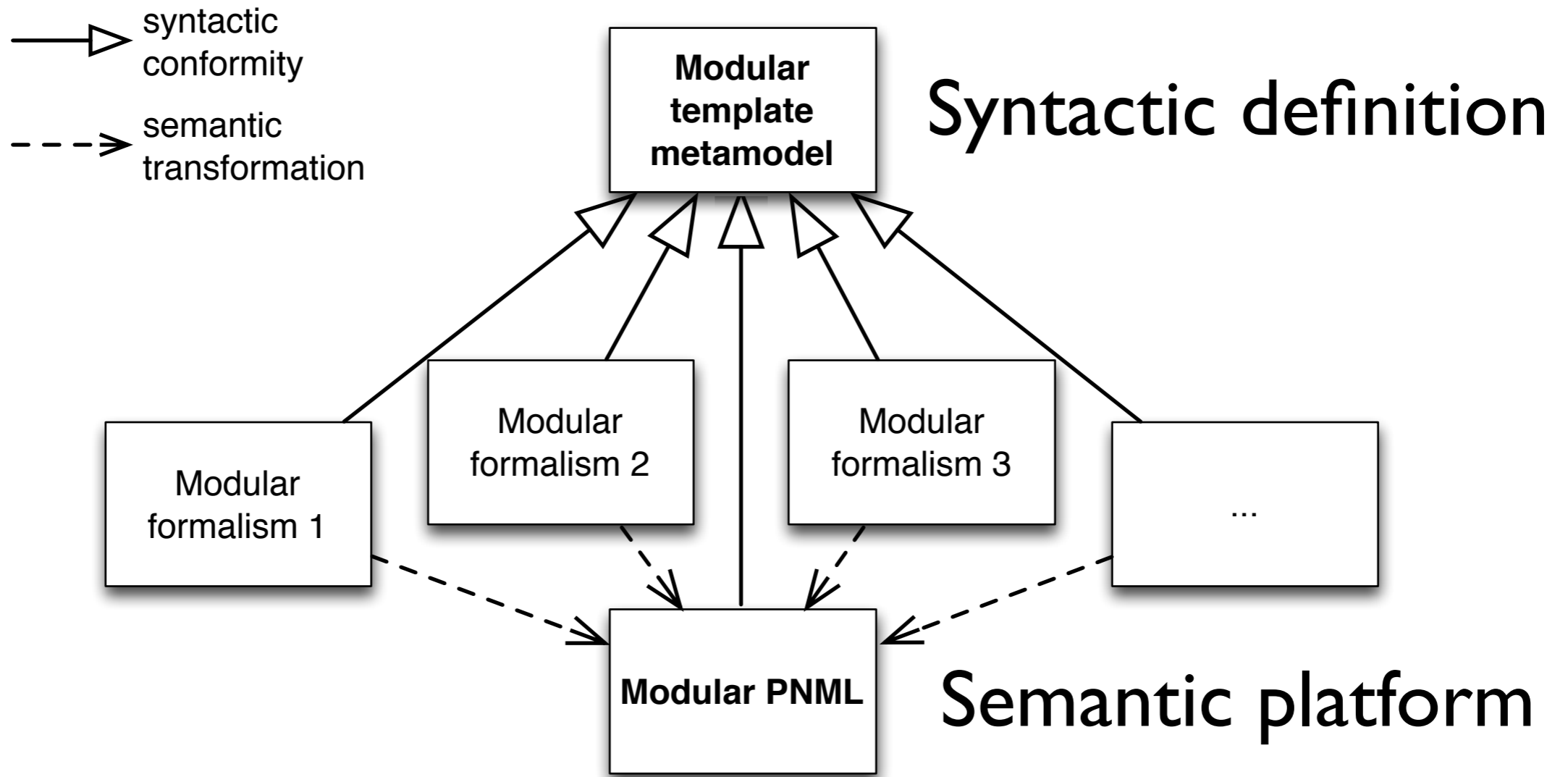


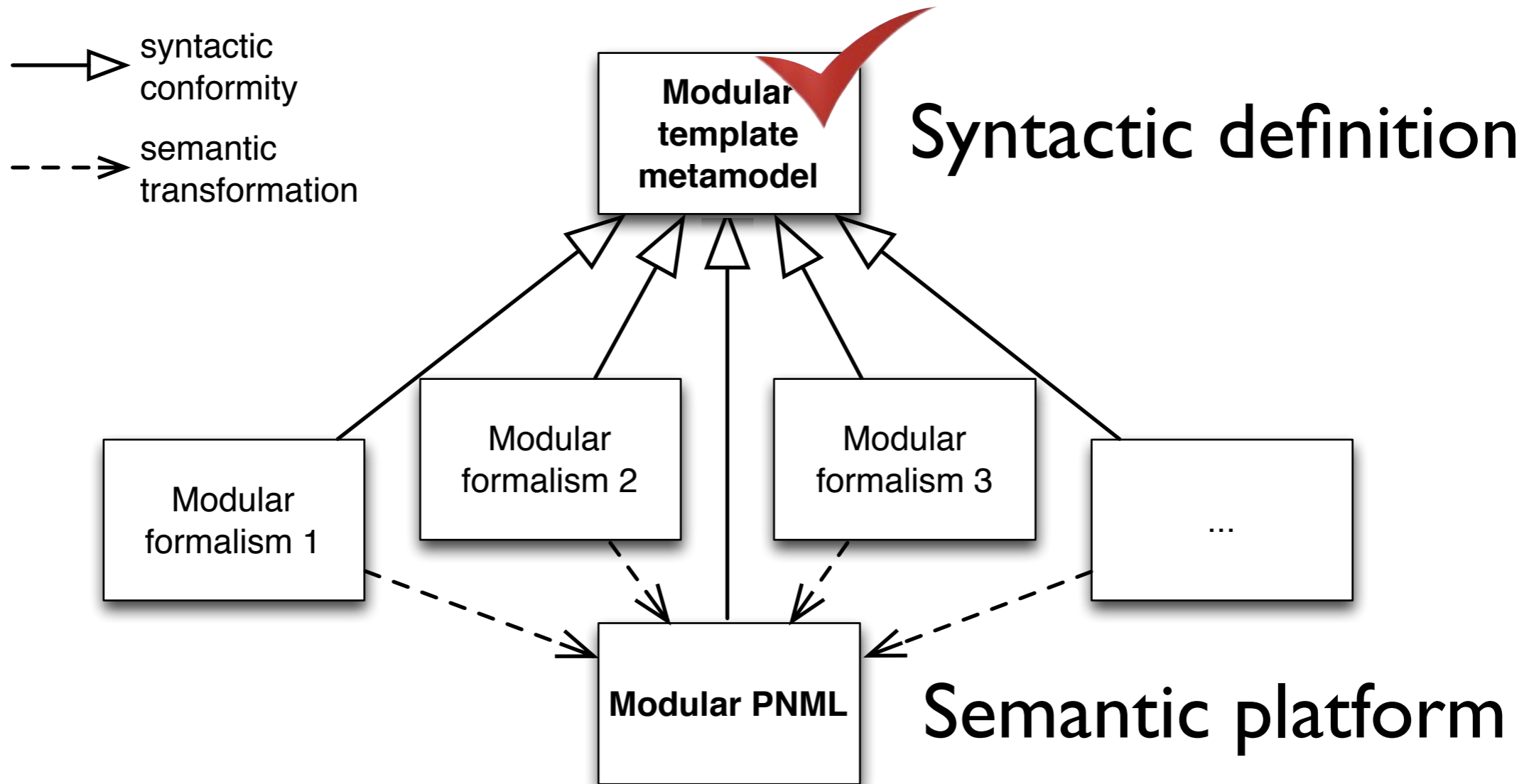
Inter-formalisms composition

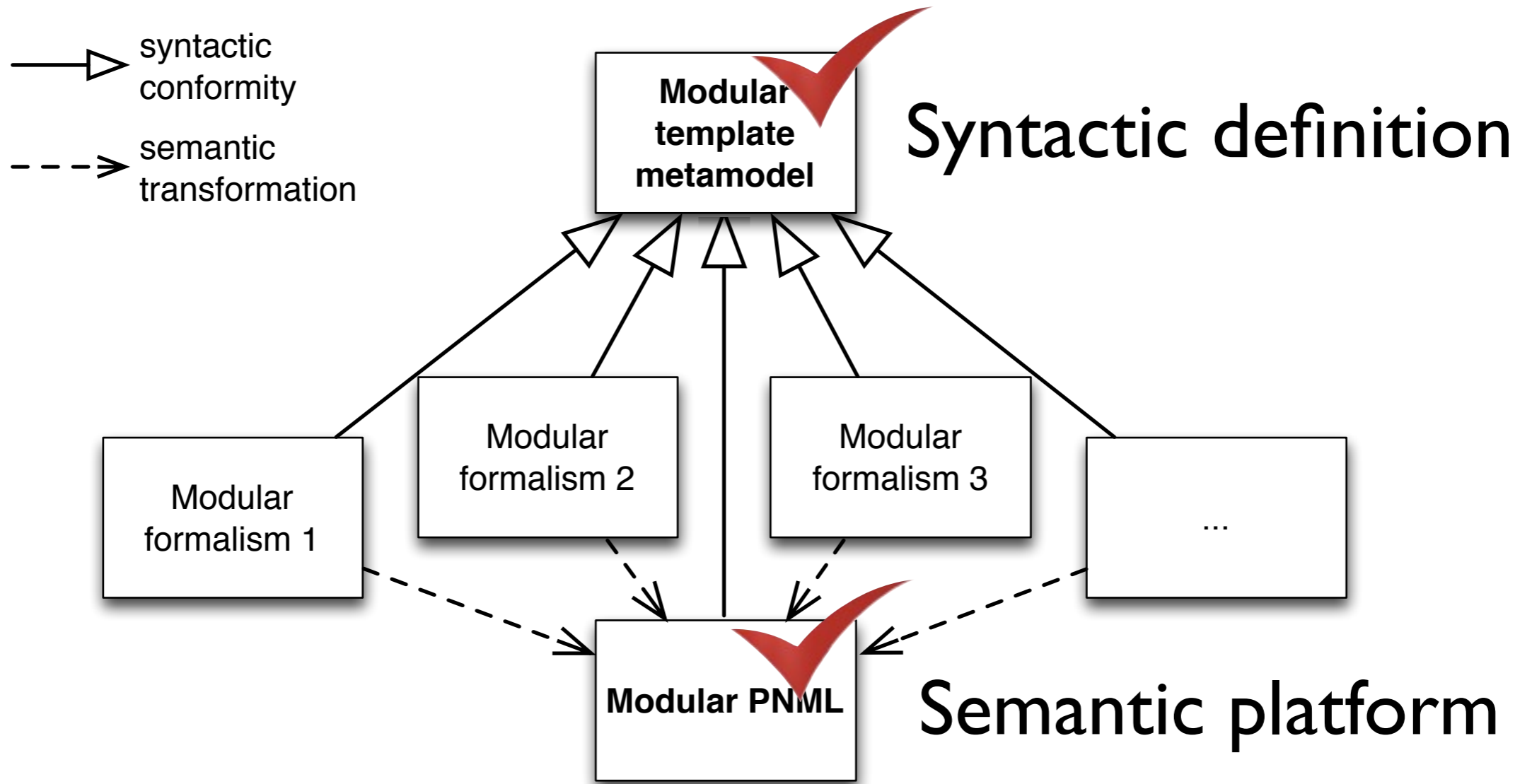


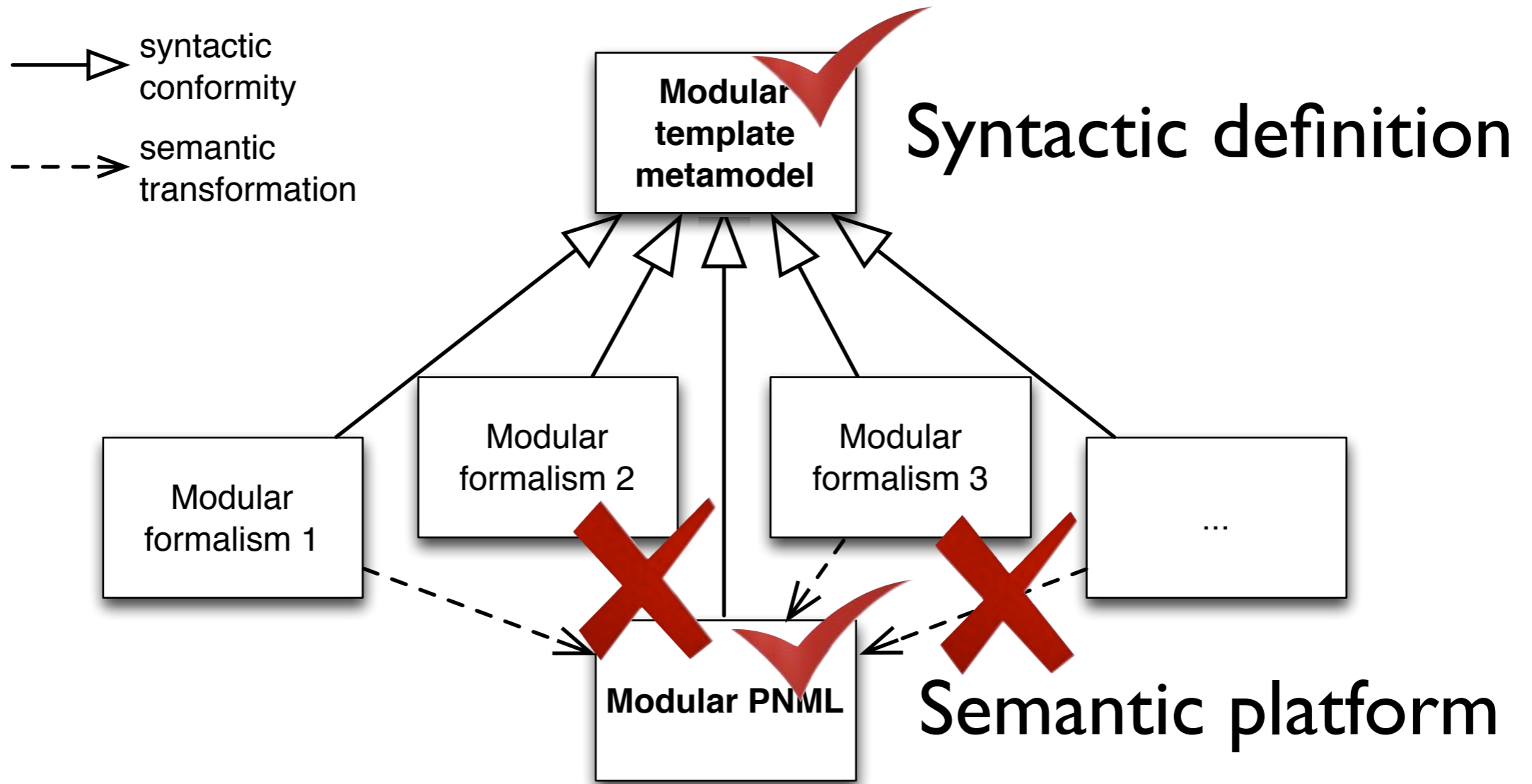
Inter-formalisms composition



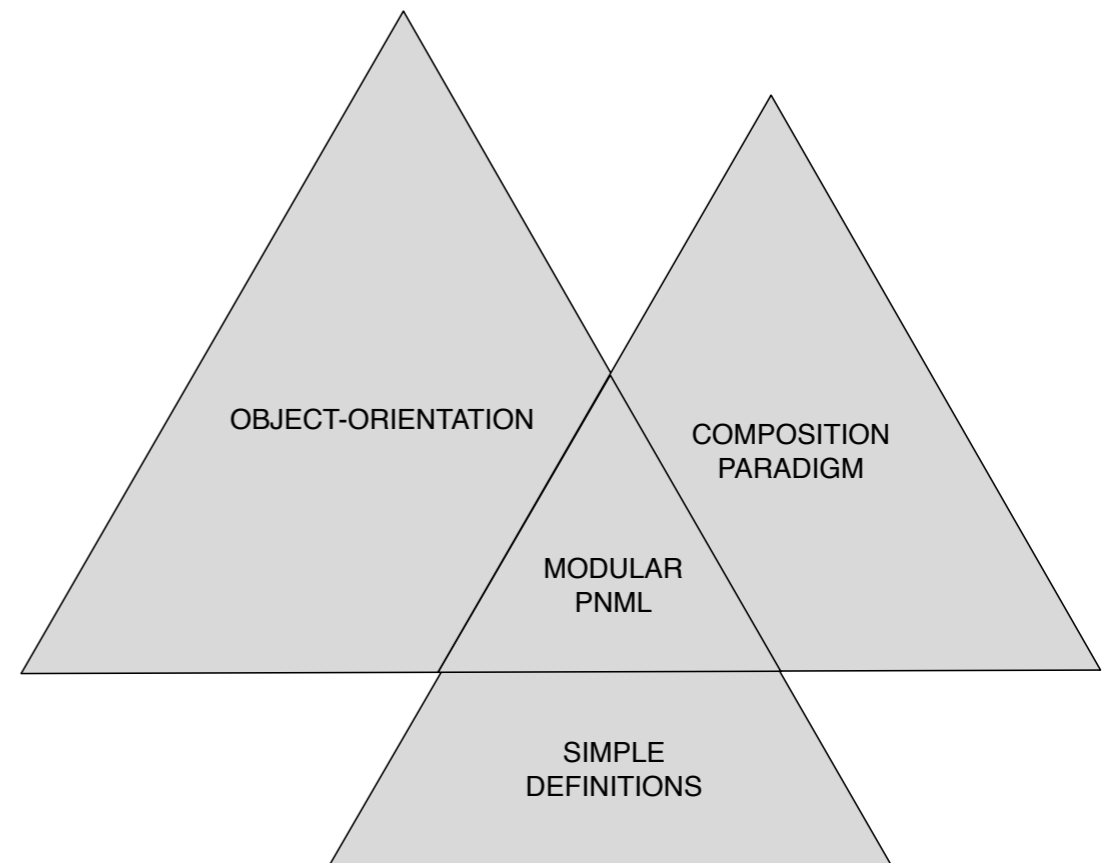
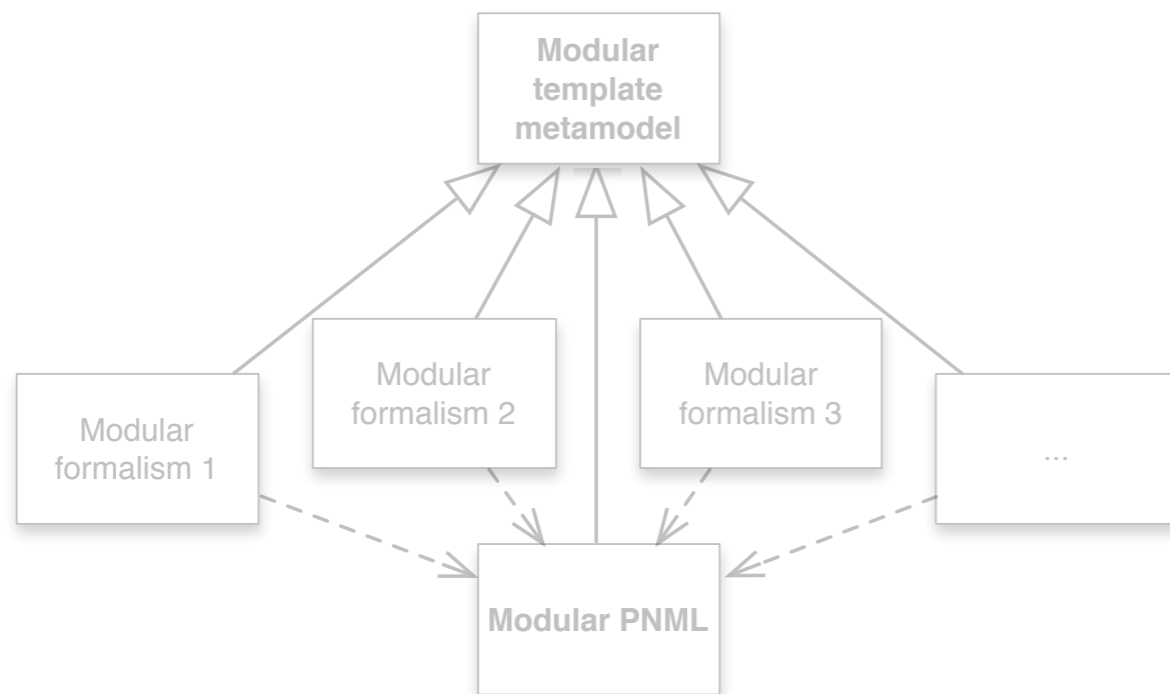
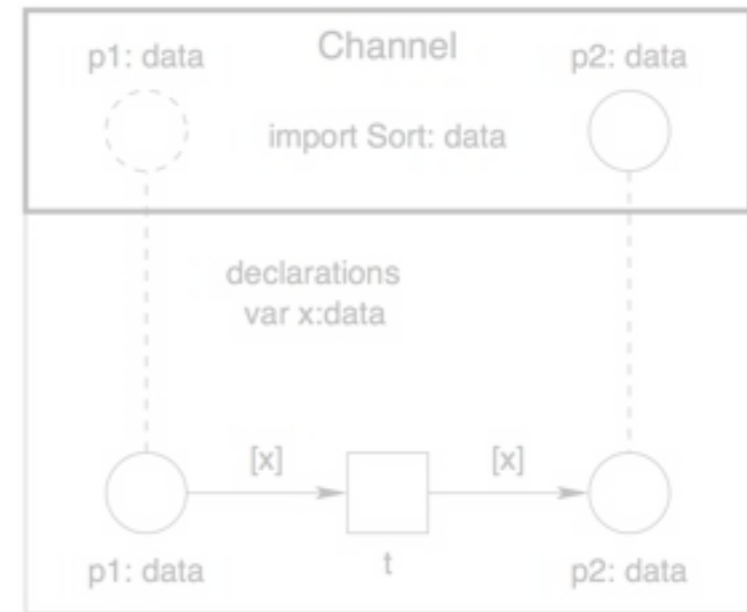






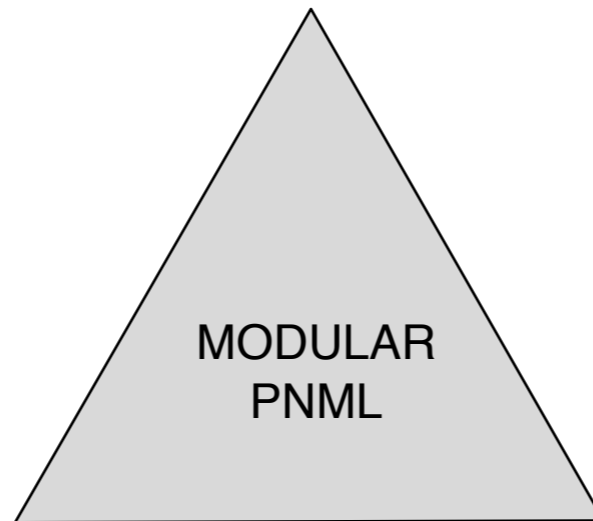


Outline

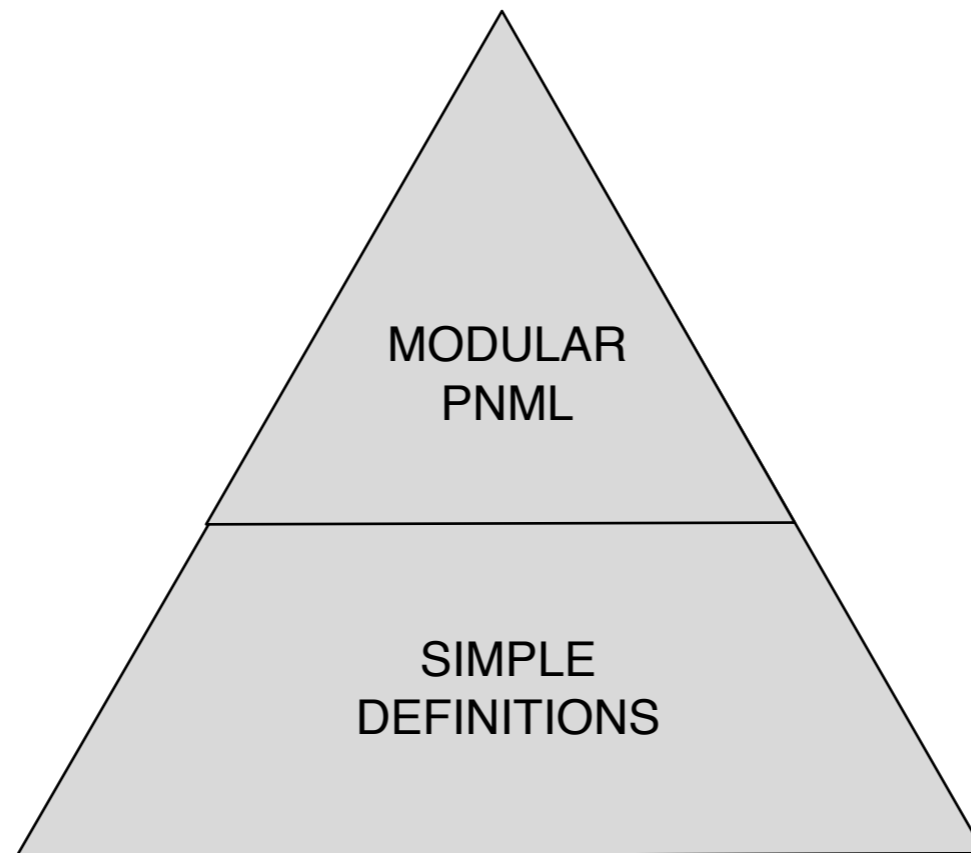


Extensions

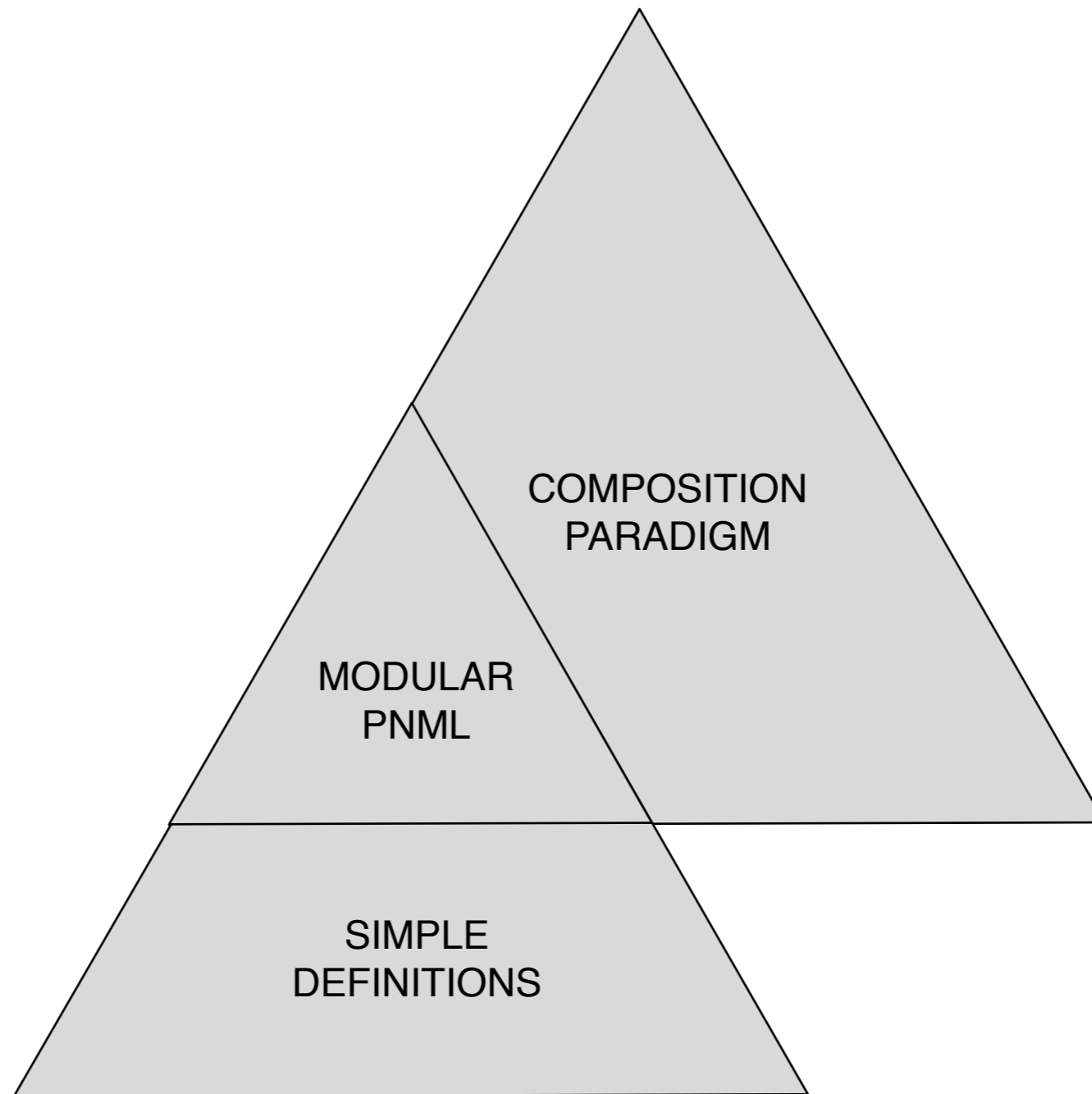
Extending Modular PNML



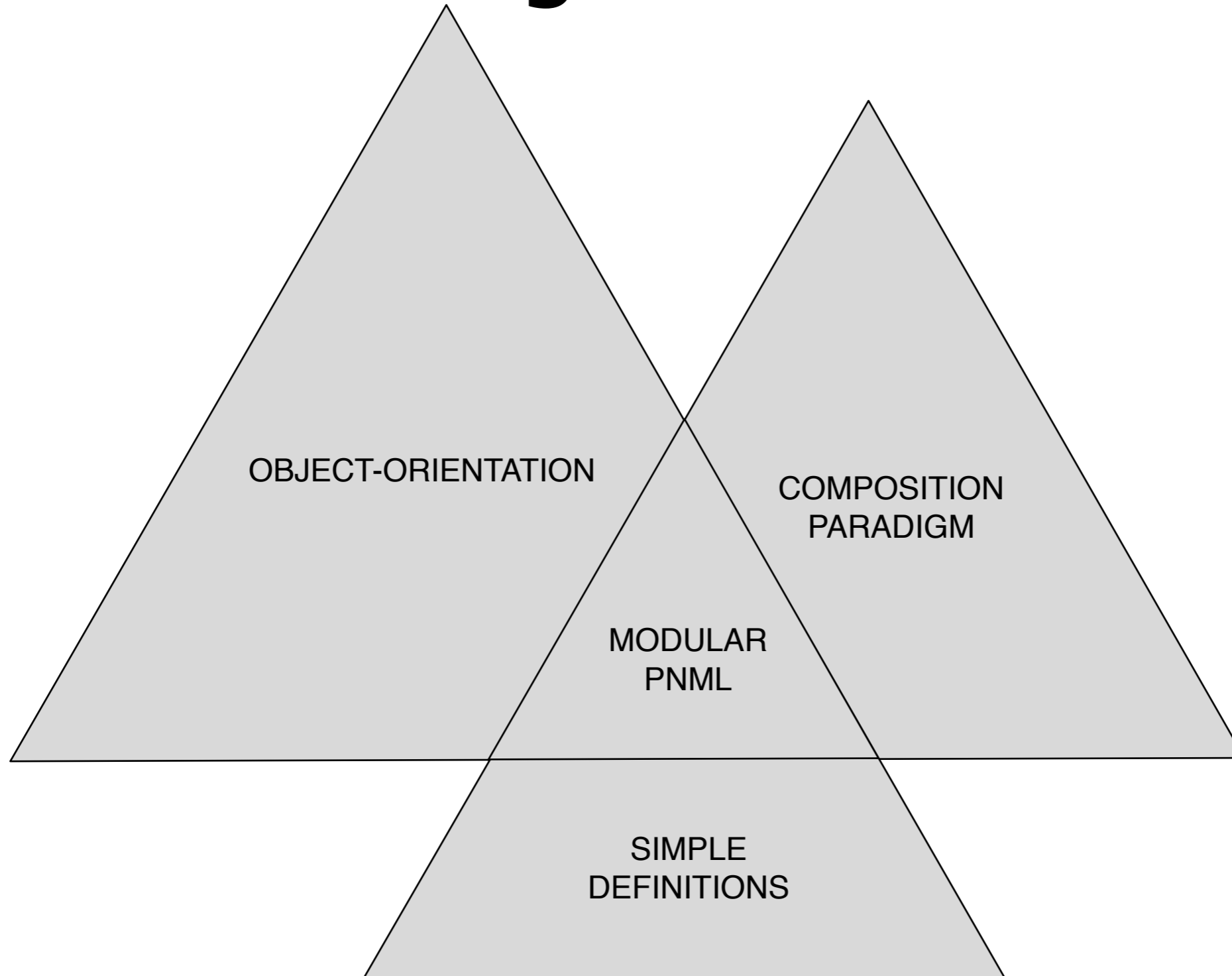
Extending Modular PNML

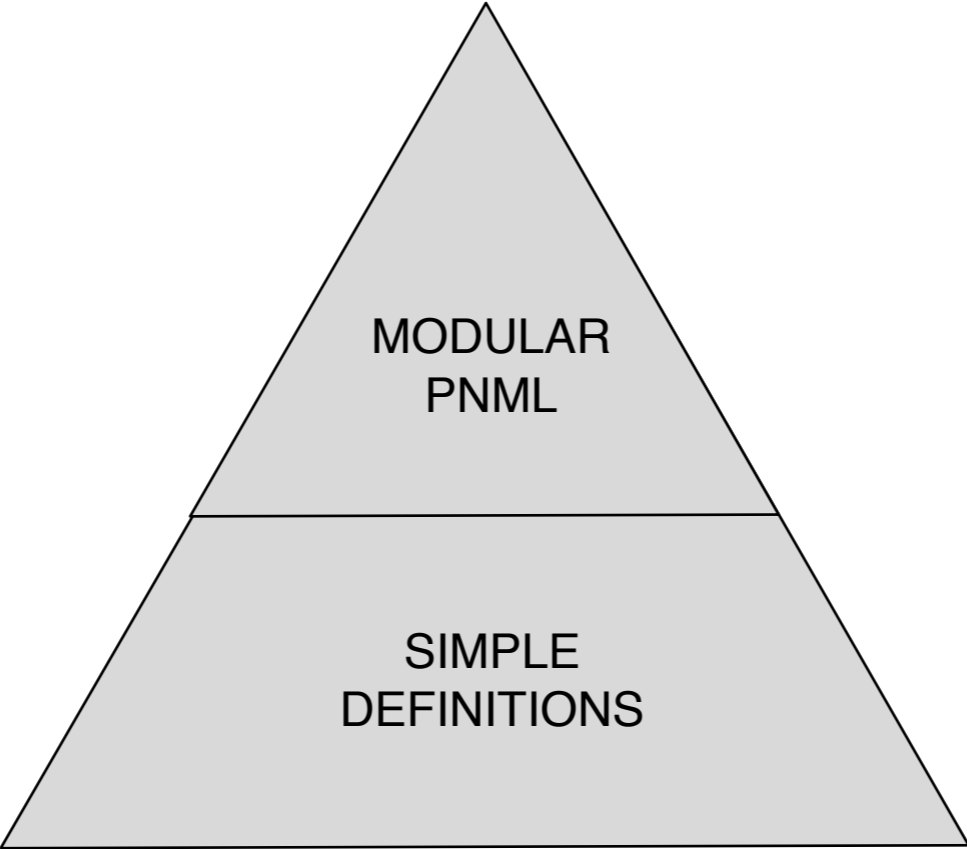


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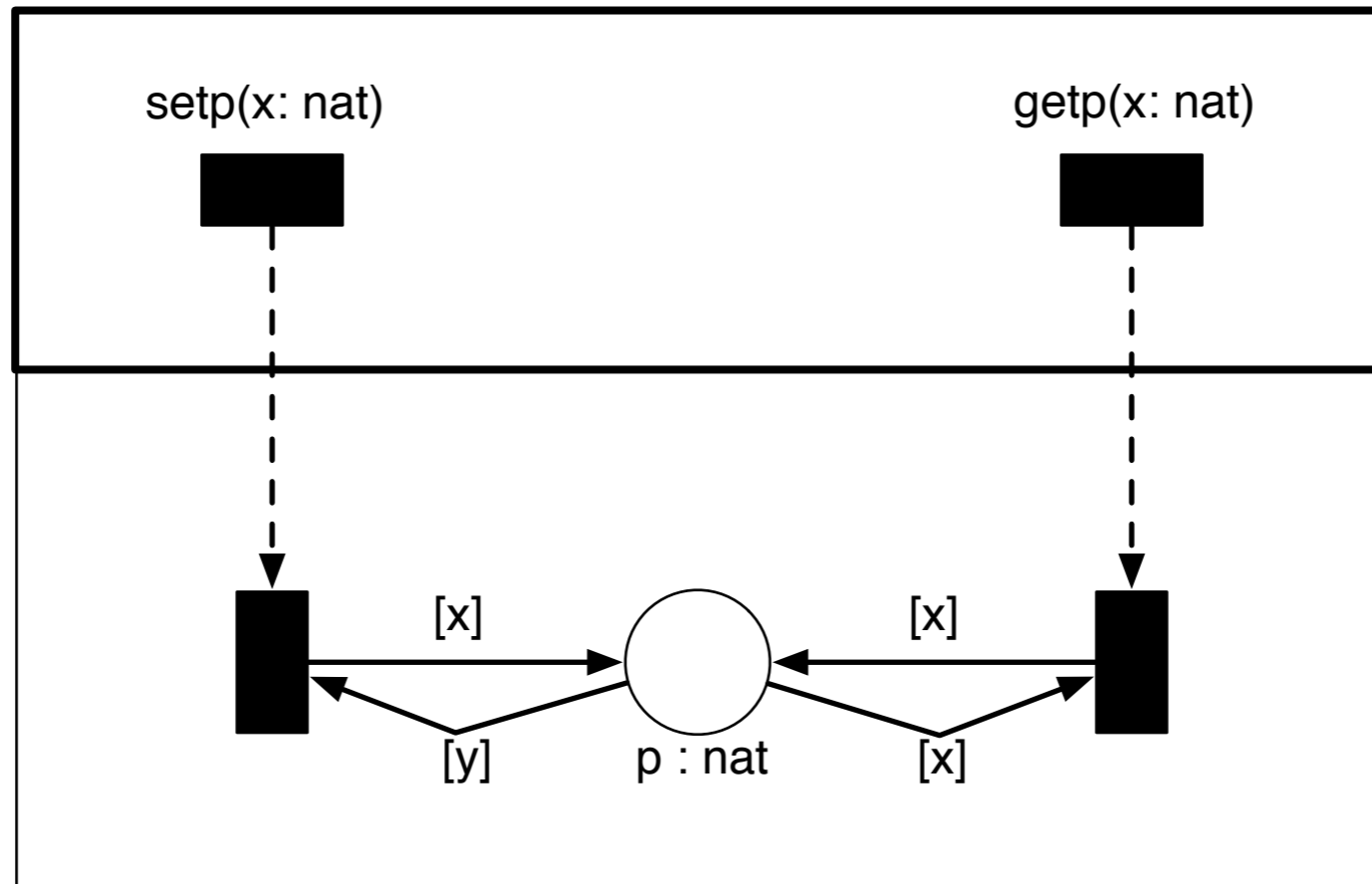




Enrich the current definitions

Enrich the current definitions

Parameterized interface transitions



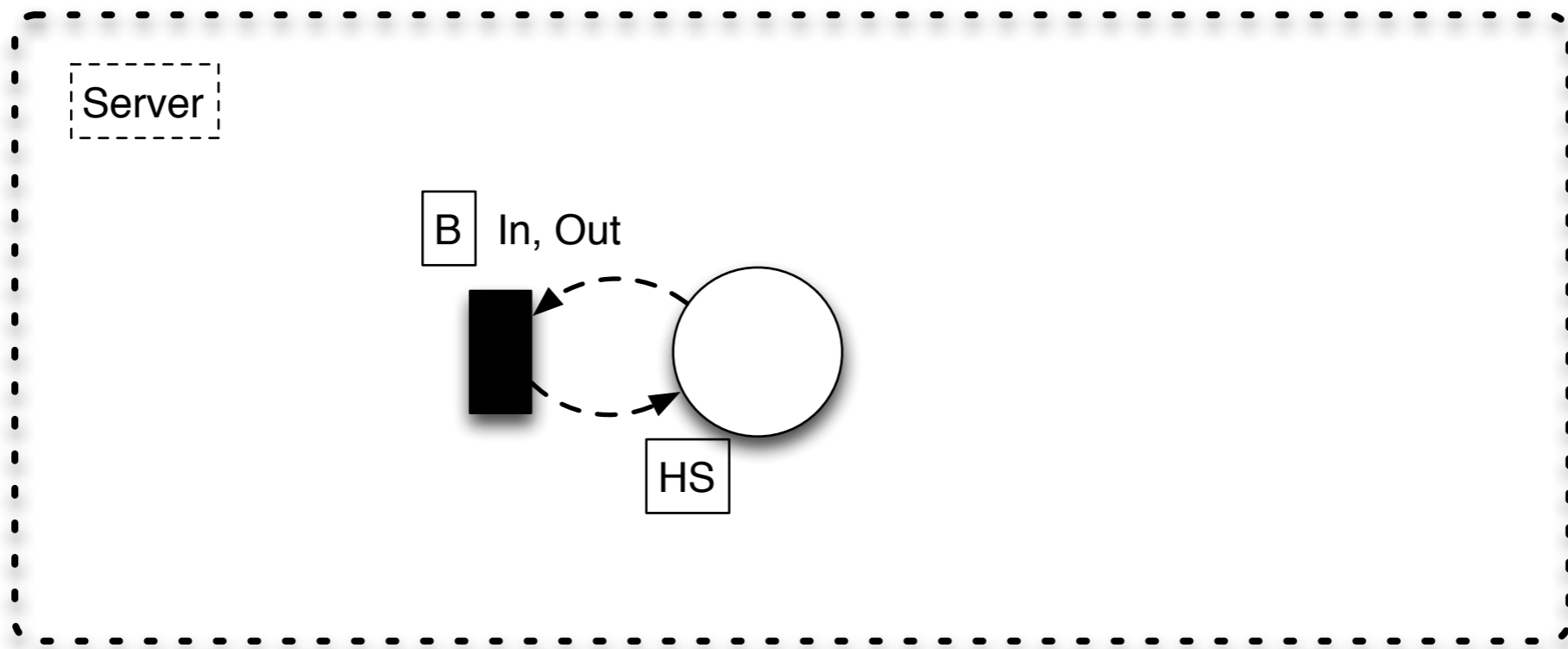
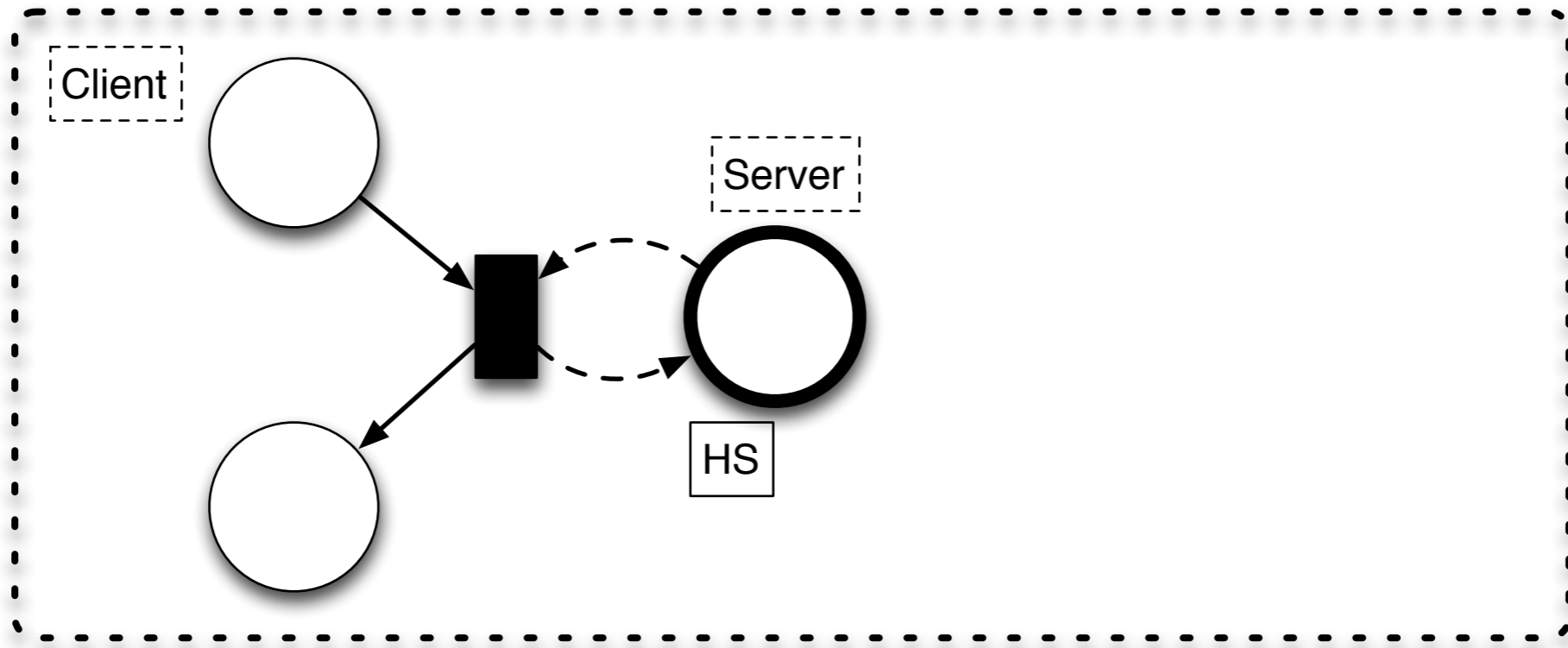
Enrich the current definitions

Parameterized interface elements

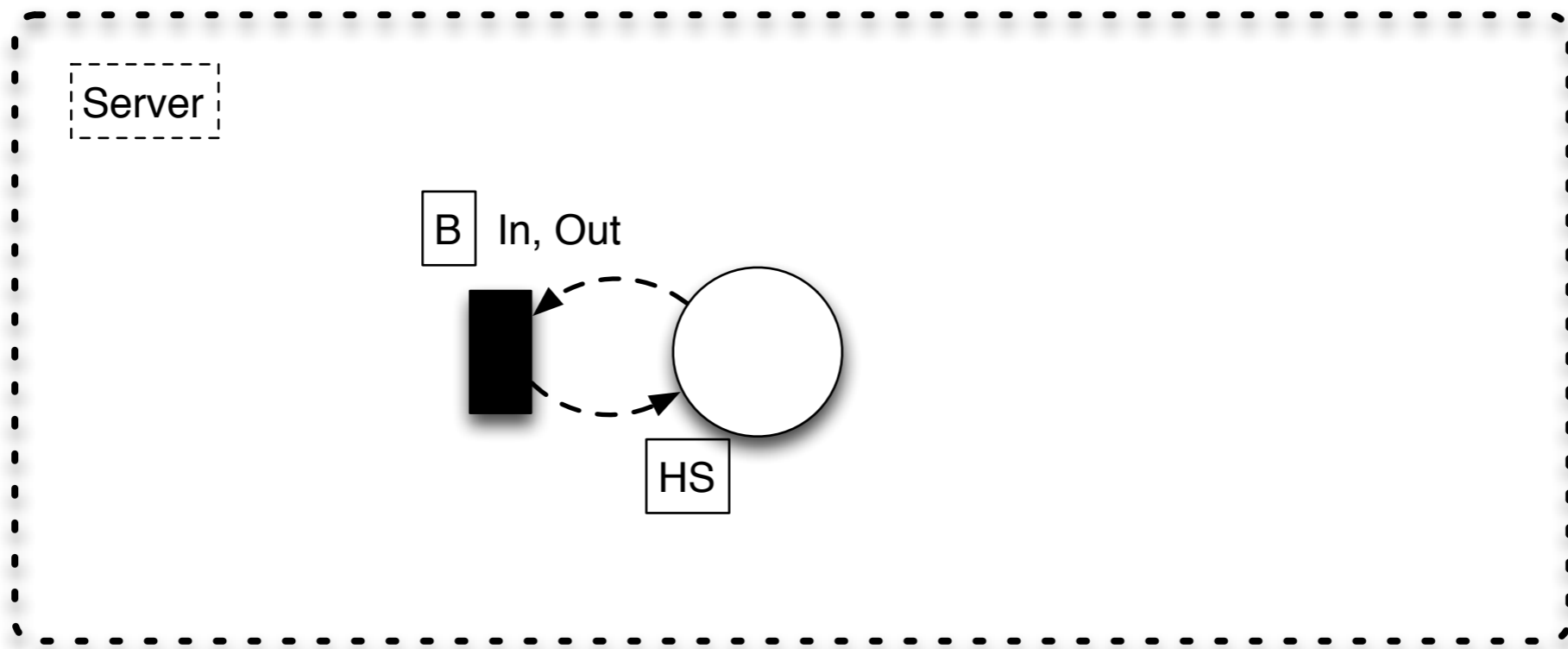
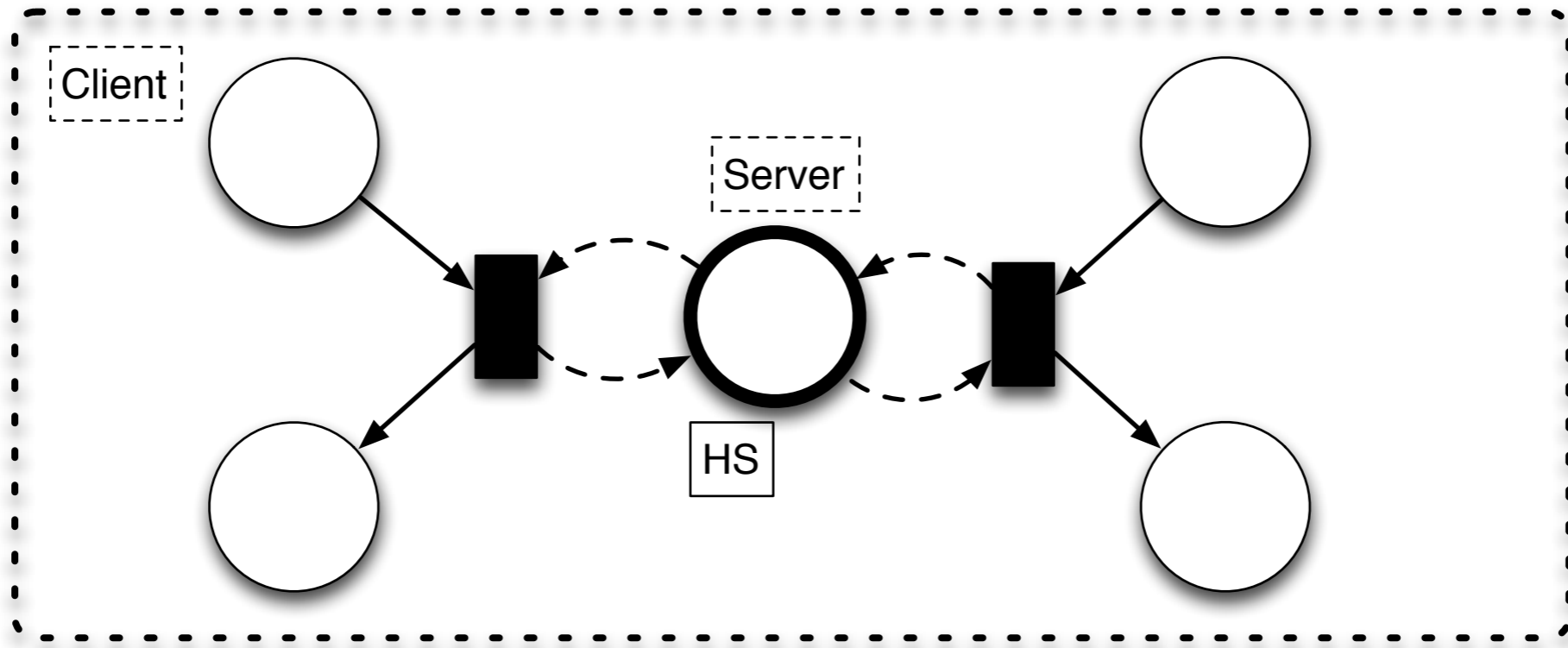
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Parameterized interface elements

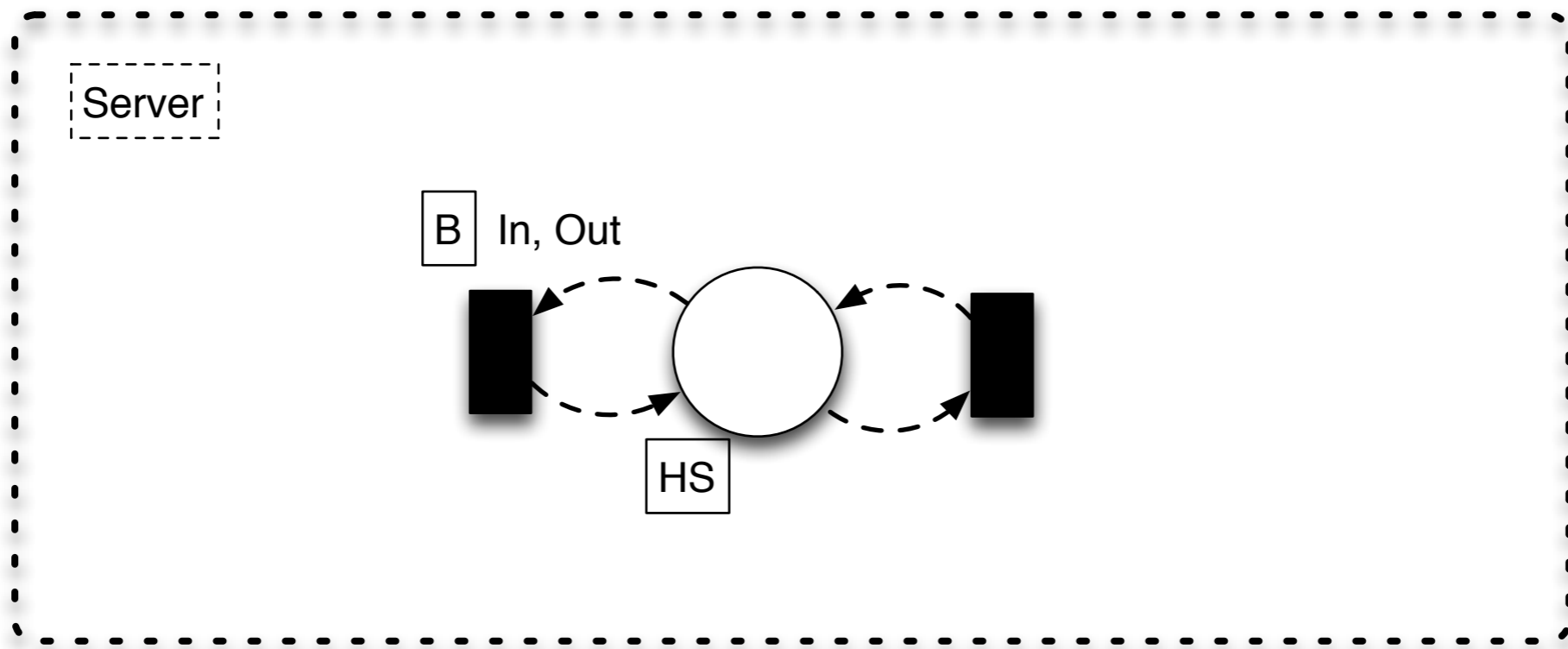
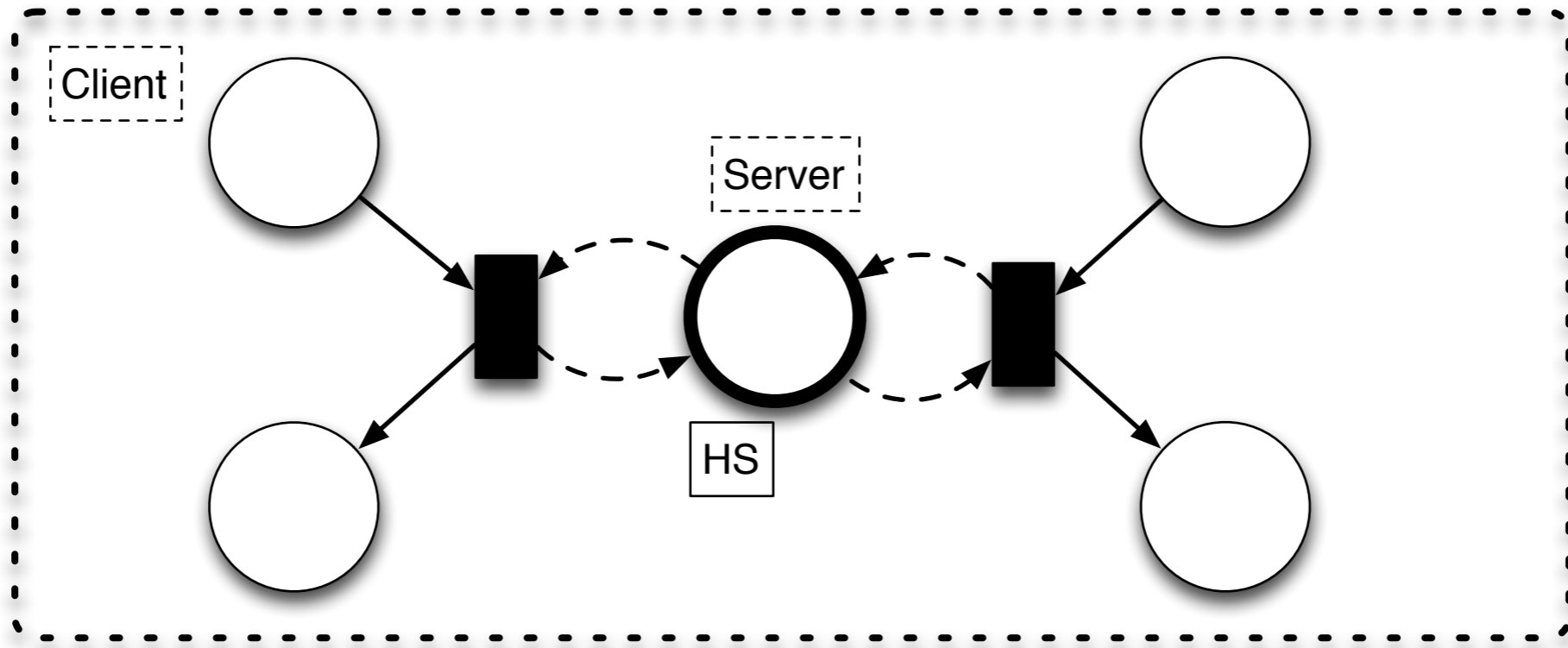
Duplication of service calls



Hubert, Jensen, Shapiro, 1991
Hierarchies in Coloured Petri Nets



Hubert, Jensen, Shapiro, 1991
Hierarchies in Coloured Petri Nets

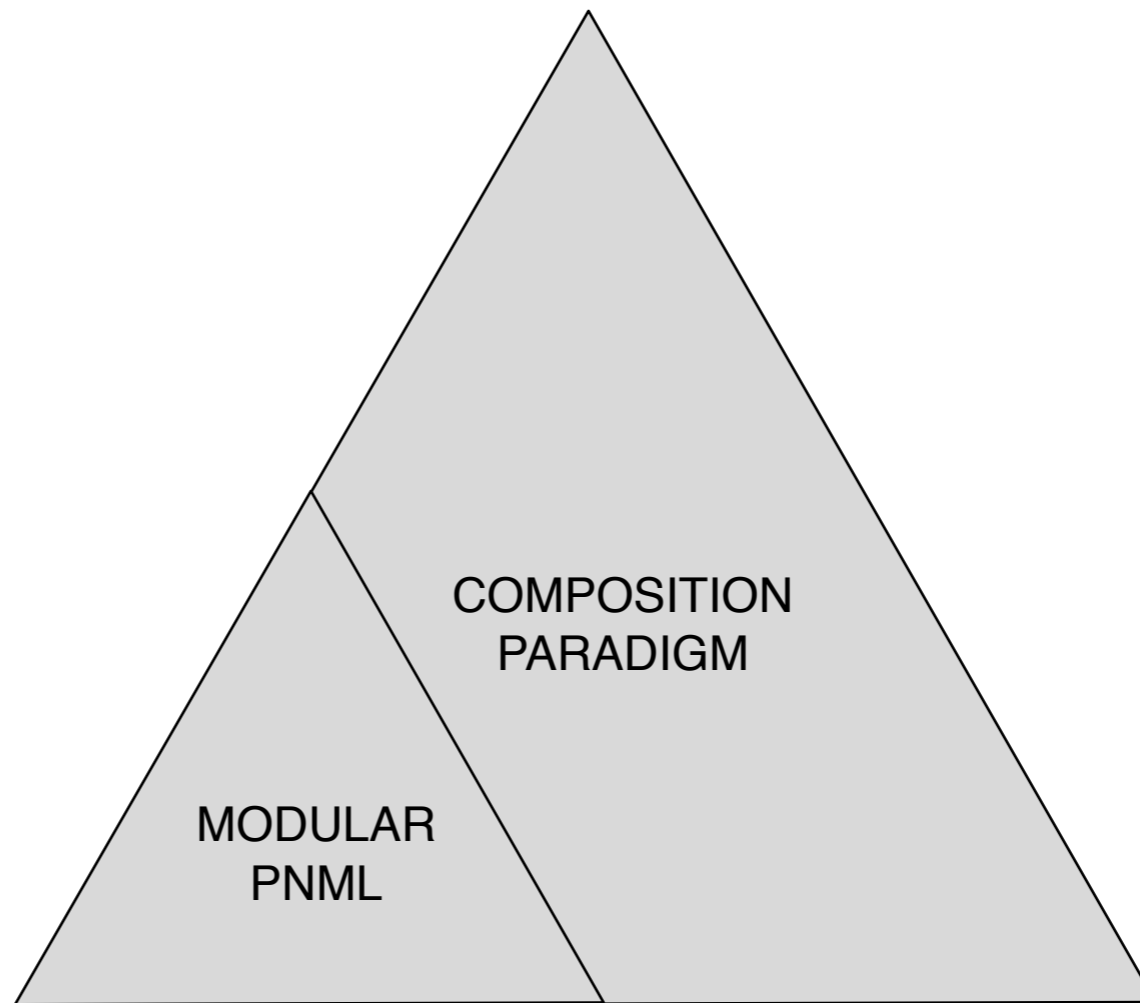


Hubert, Jensen, Shapiro, 1991
Hierarchies in Coloured Petri Nets

Enrich the current definitions

Parameterized interface elements

Duplication of service calls



Enrich the current definitions

Parameterized interface elements

Duplication of service calls

Change the composition paradigm

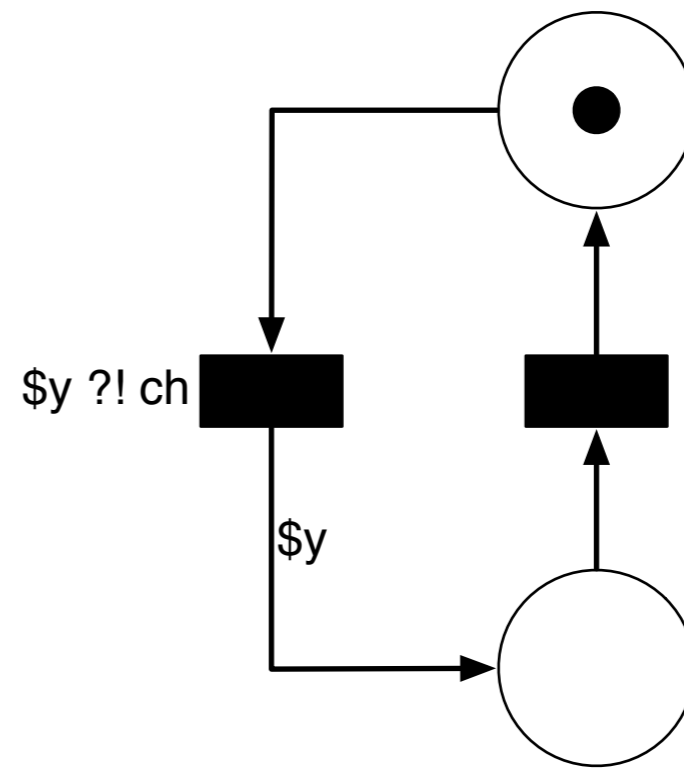
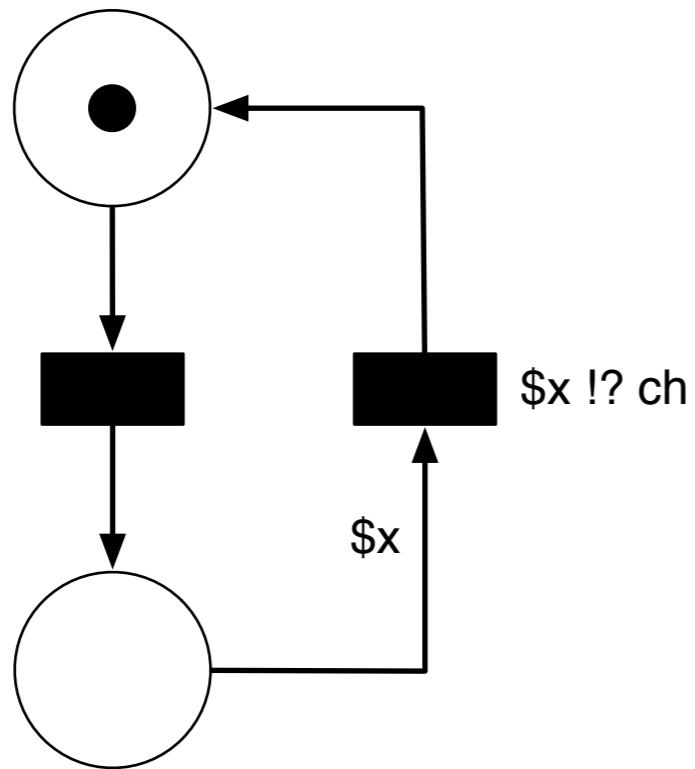
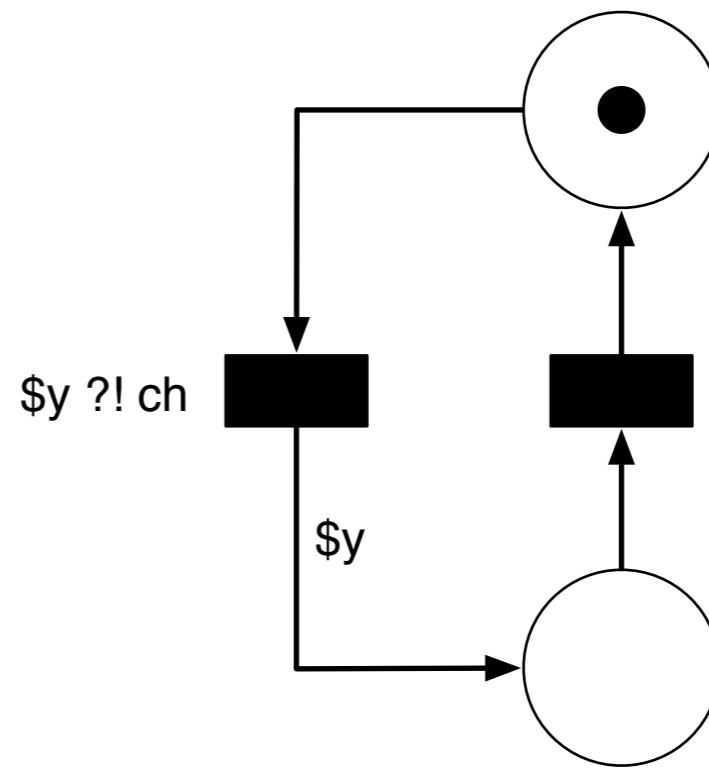
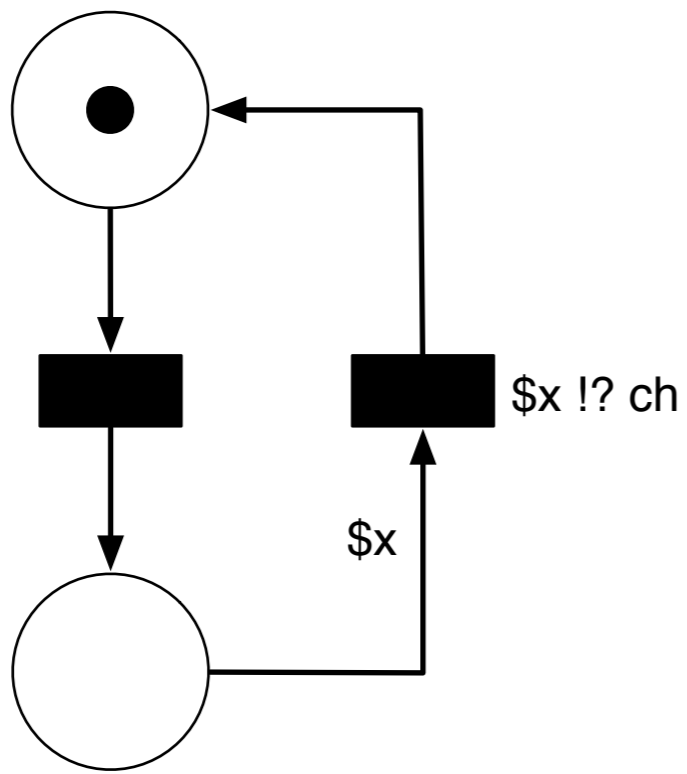
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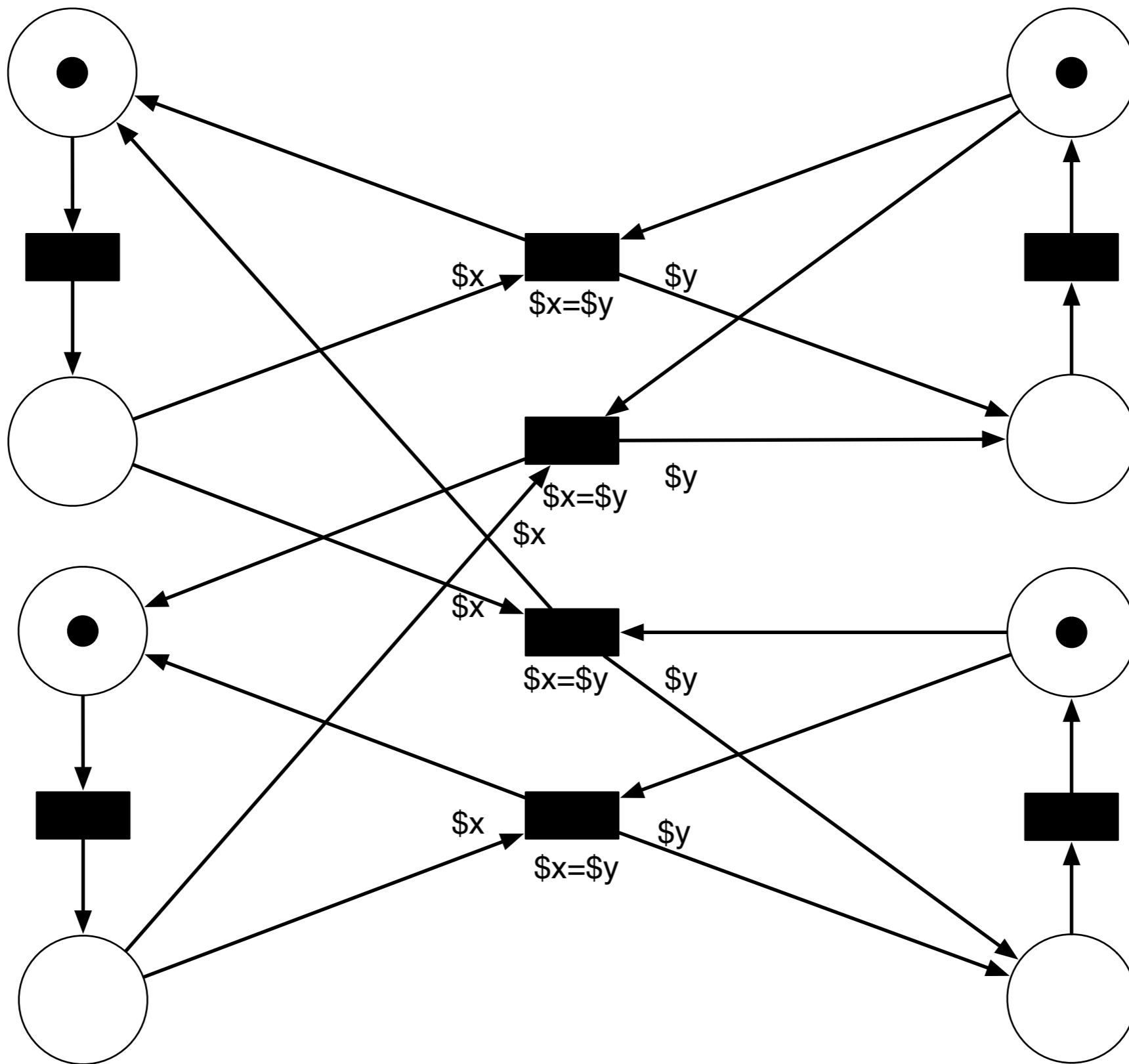
Non-deterministic compositions



Christensen, Damgaard Hansen, 1994,



Coloured Petri Nets Extended with Channels for Synchronous Communication



Christensen, Damgaard Hansen, 1994,



Coloured Petri Nets Extended with Channels for Synchronous Communication

Enrich the current definitions

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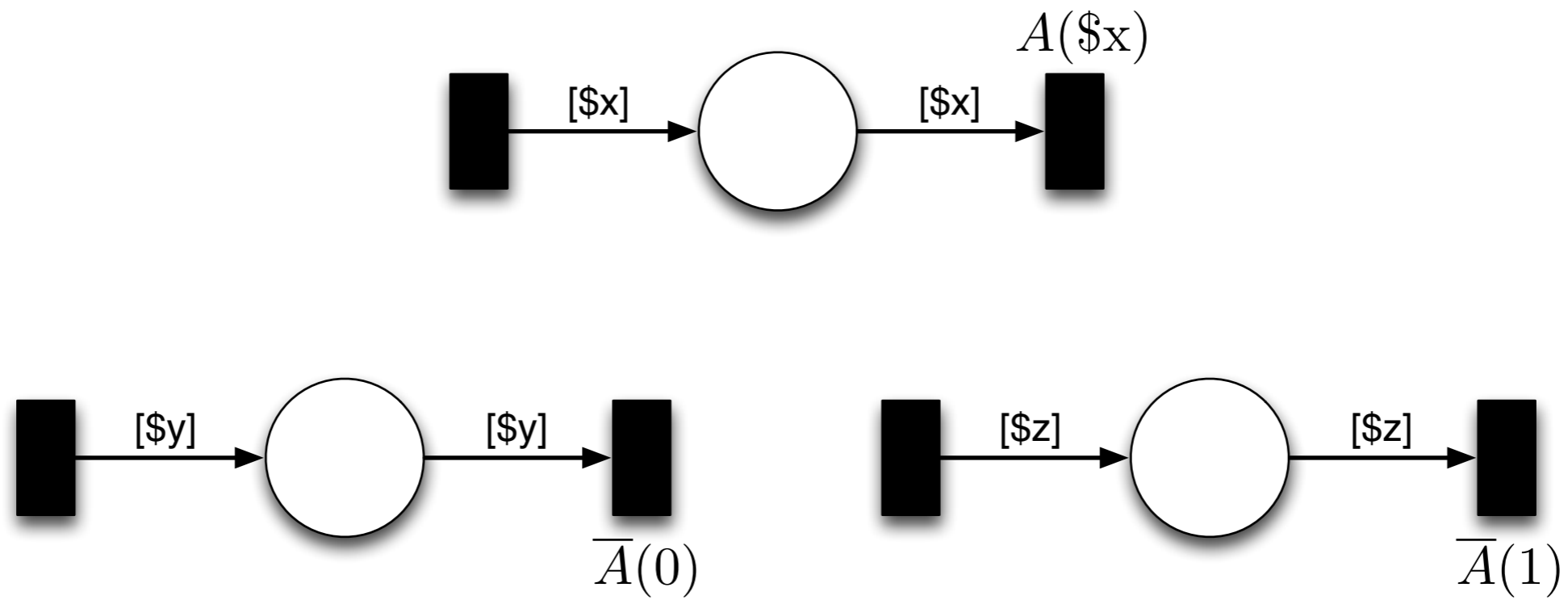
Parameterized interface elements

Duplication of service calls

Change the composition paradigm

Non-deterministic compositions

Parameter-based compositions



Lilius, 1996,
OB(PN)2: An Object Based Petri Nets Programming Notation

Enrich the current definitions

- Parameterized interface elements

- Duplication of service calls

Change the composition paradigm

- Non-deterministic compositions

- Parameter-based compositions

Enrich the current definitions

- Parameterized interface elements

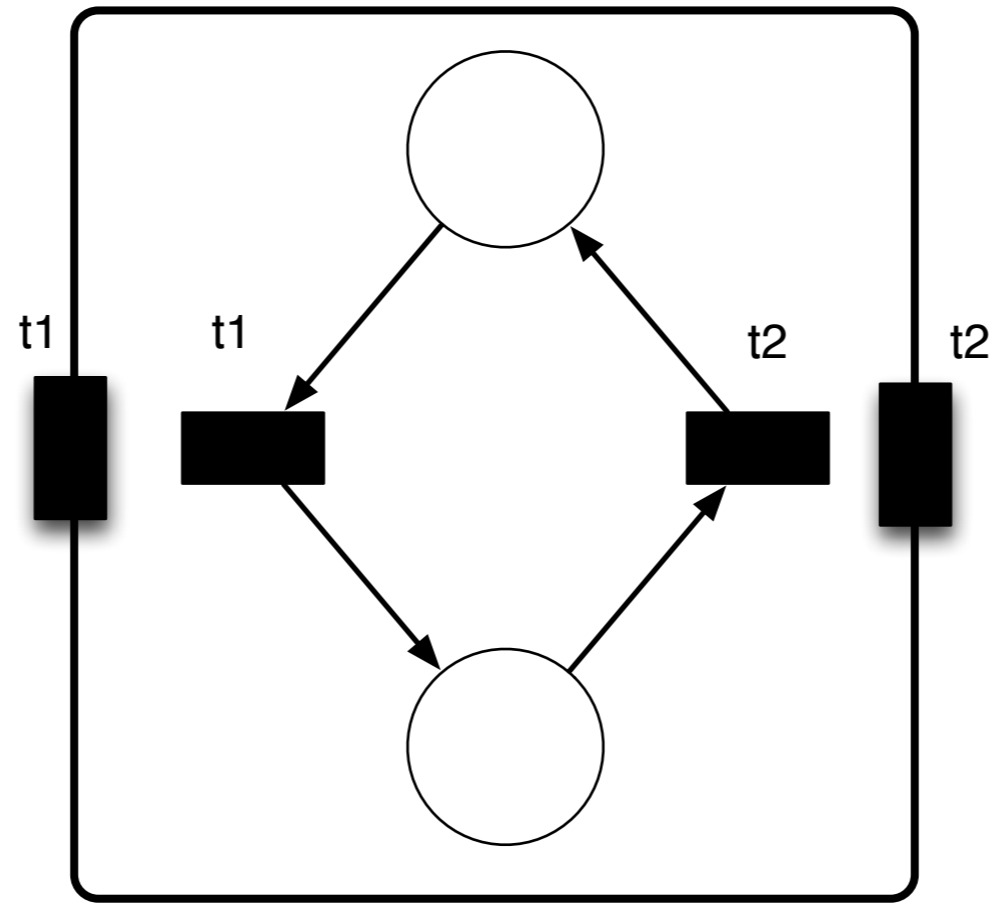
- Duplication of service calls

Change the composition paradigm

- Non-deterministic compositions

- Parameter-based compositions

- Priority-based compositions



$t1 > t2$

Bozga, Sfyrla, Sifakis, 2009,
Modeling Synchronous Systems in BIP

Enrich the current definitions

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- Duplication of service calls

Change the composition paradigm

- Non-deterministic compositions

- Parameter-based compositions

- Priority-based compositions

Enrich the current definitions

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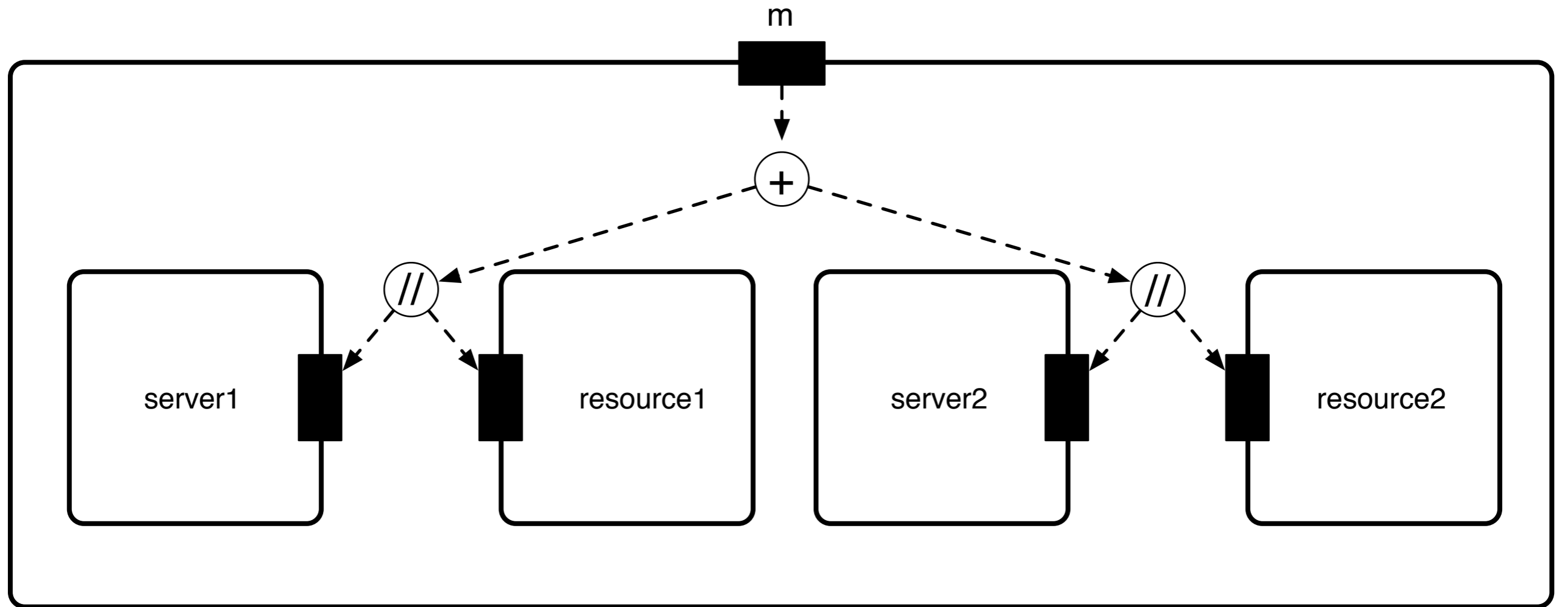
Change the composition paradigm

Non-deterministic compositions

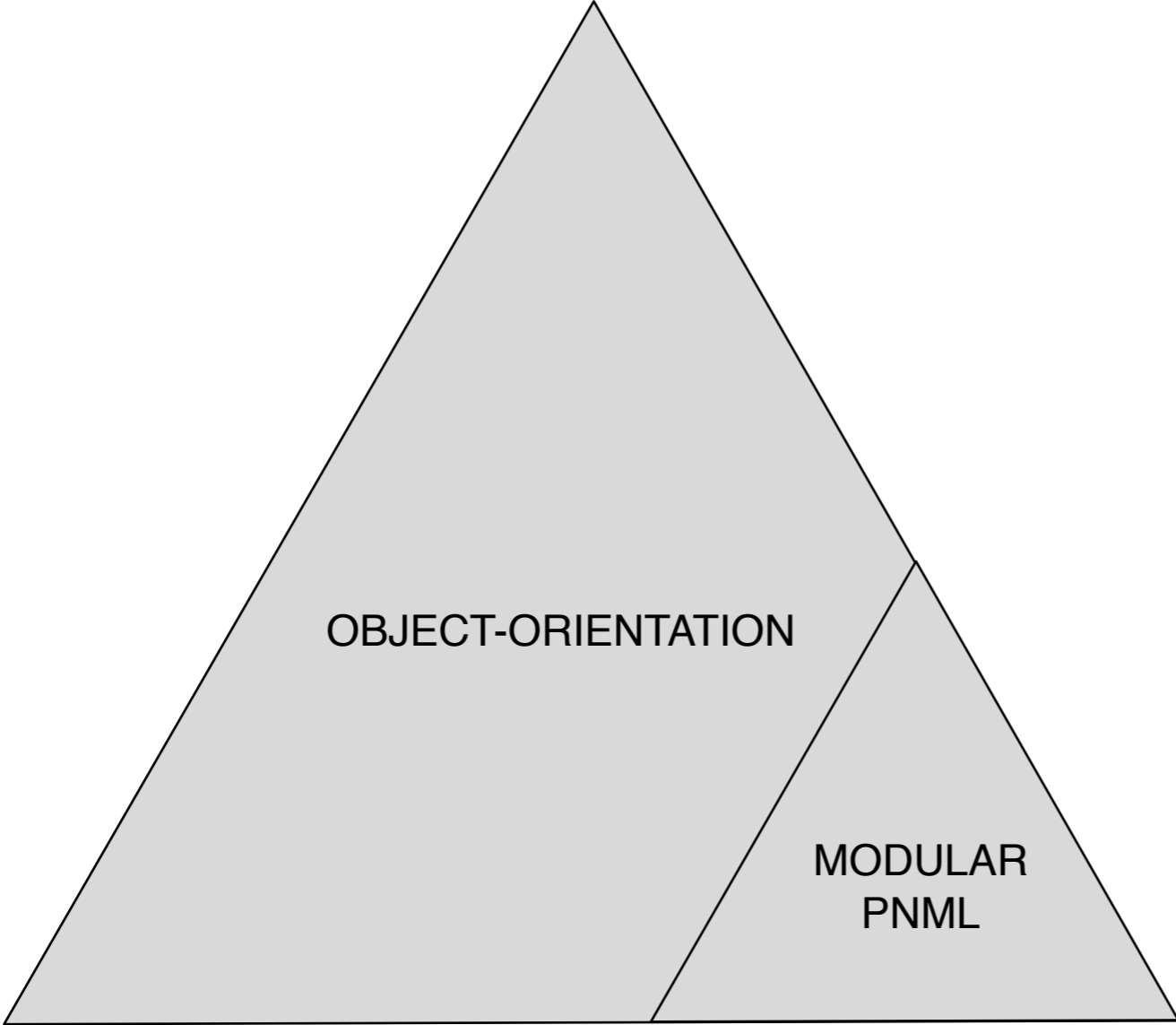
Parameter-based compositions

Priority-based compositions

Complex
synchronizations



Biberstein, Buchs, Guelfi, 2001,
Object-Oriented Nets with Algebraic Specifications: The CO-OPN/2 Formalism



Enrich the current definitions

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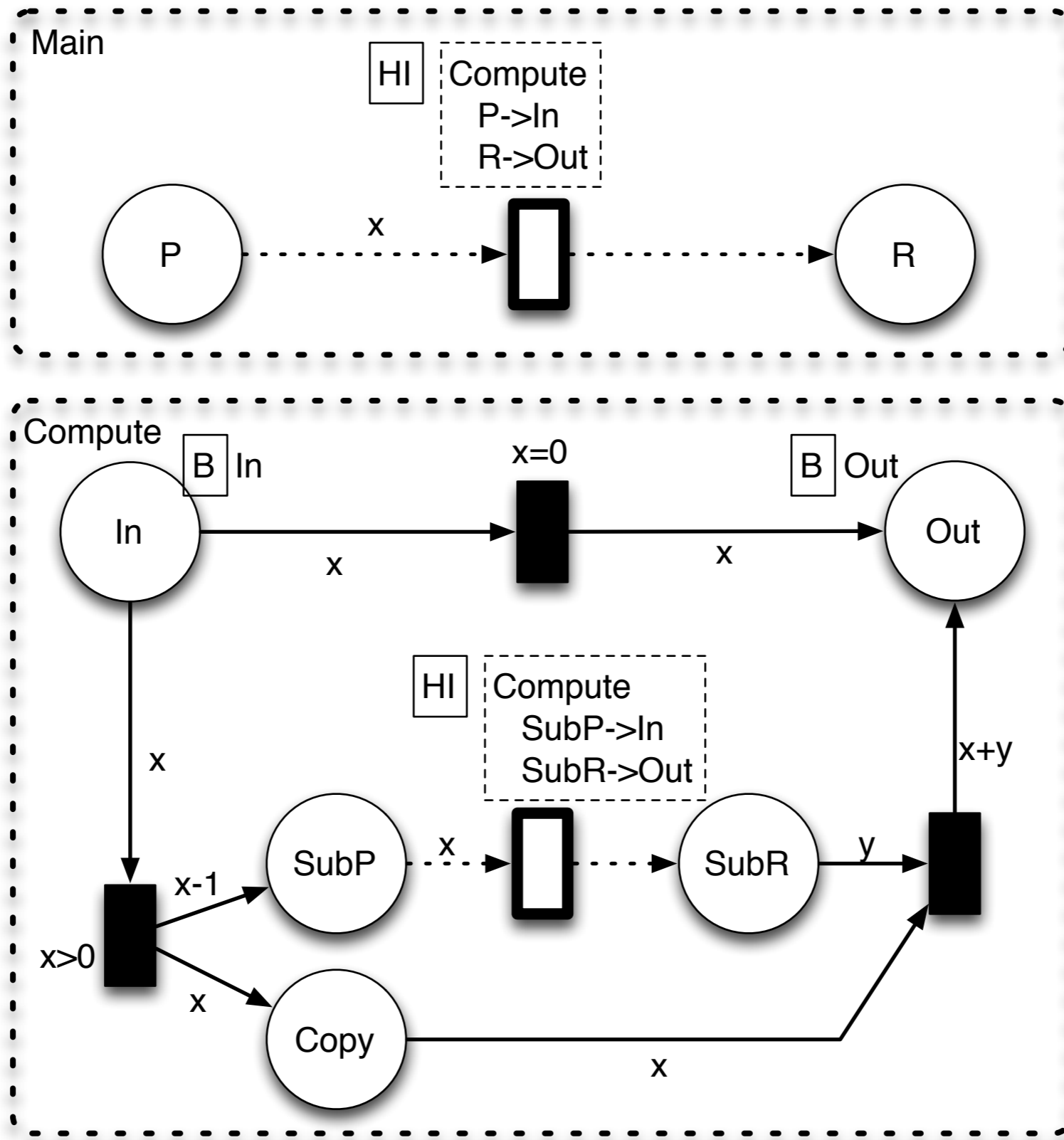
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Add object-orientation

Dynamic instantiation



Hubert, Jensen, Shapiro, 1991
 ★ Hierarchies in Coloured Petri Nets

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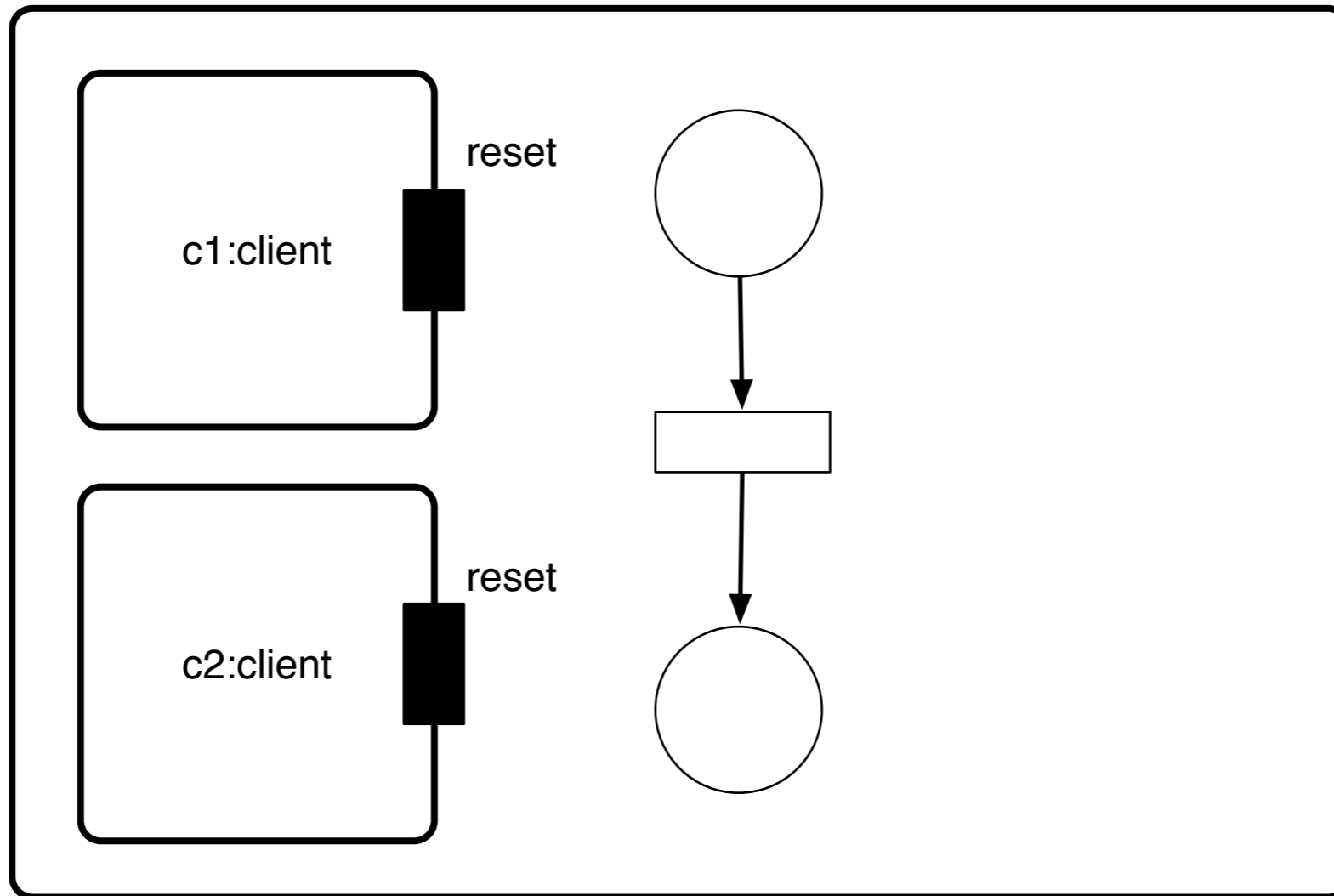
} Complex
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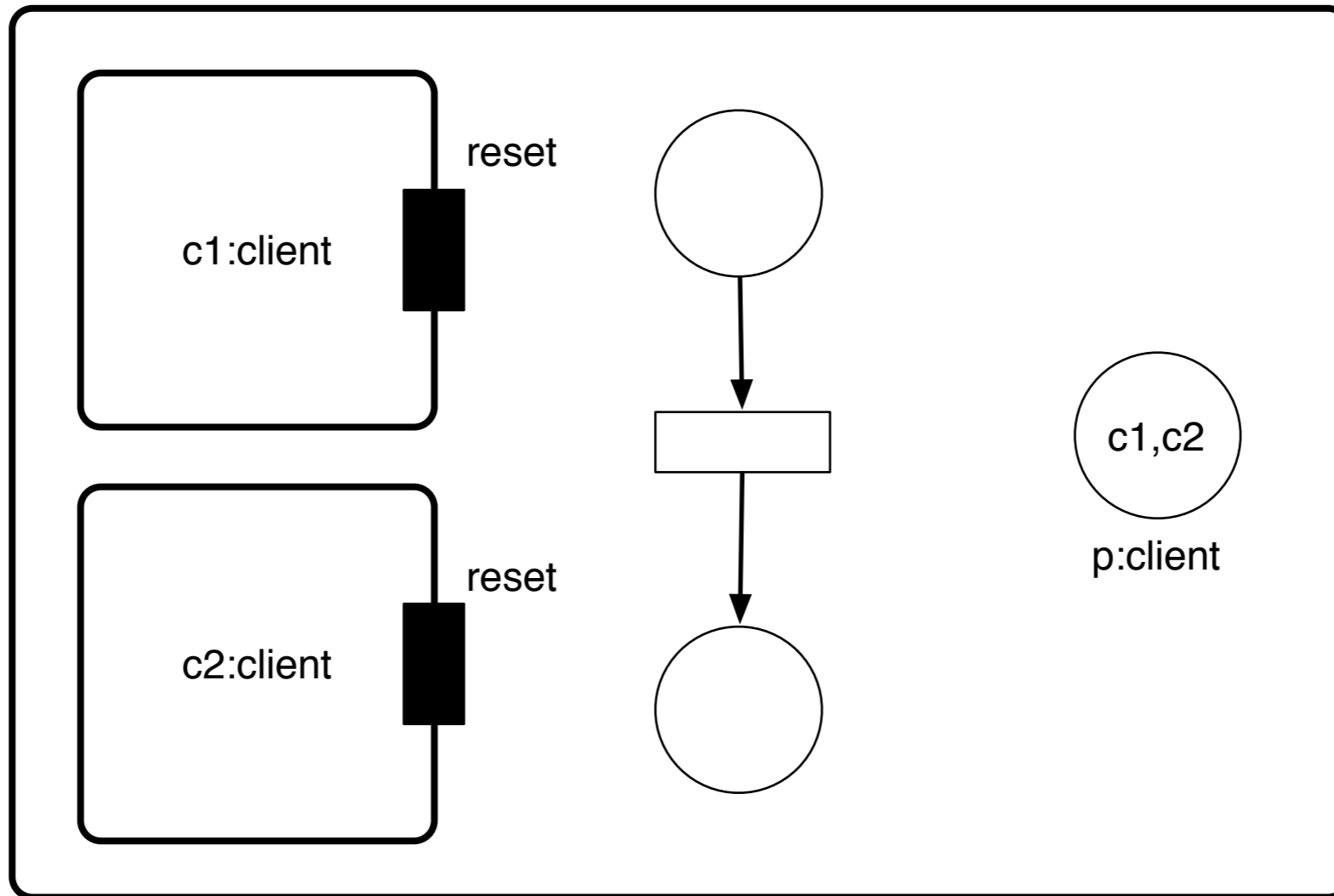
Add object-orientation

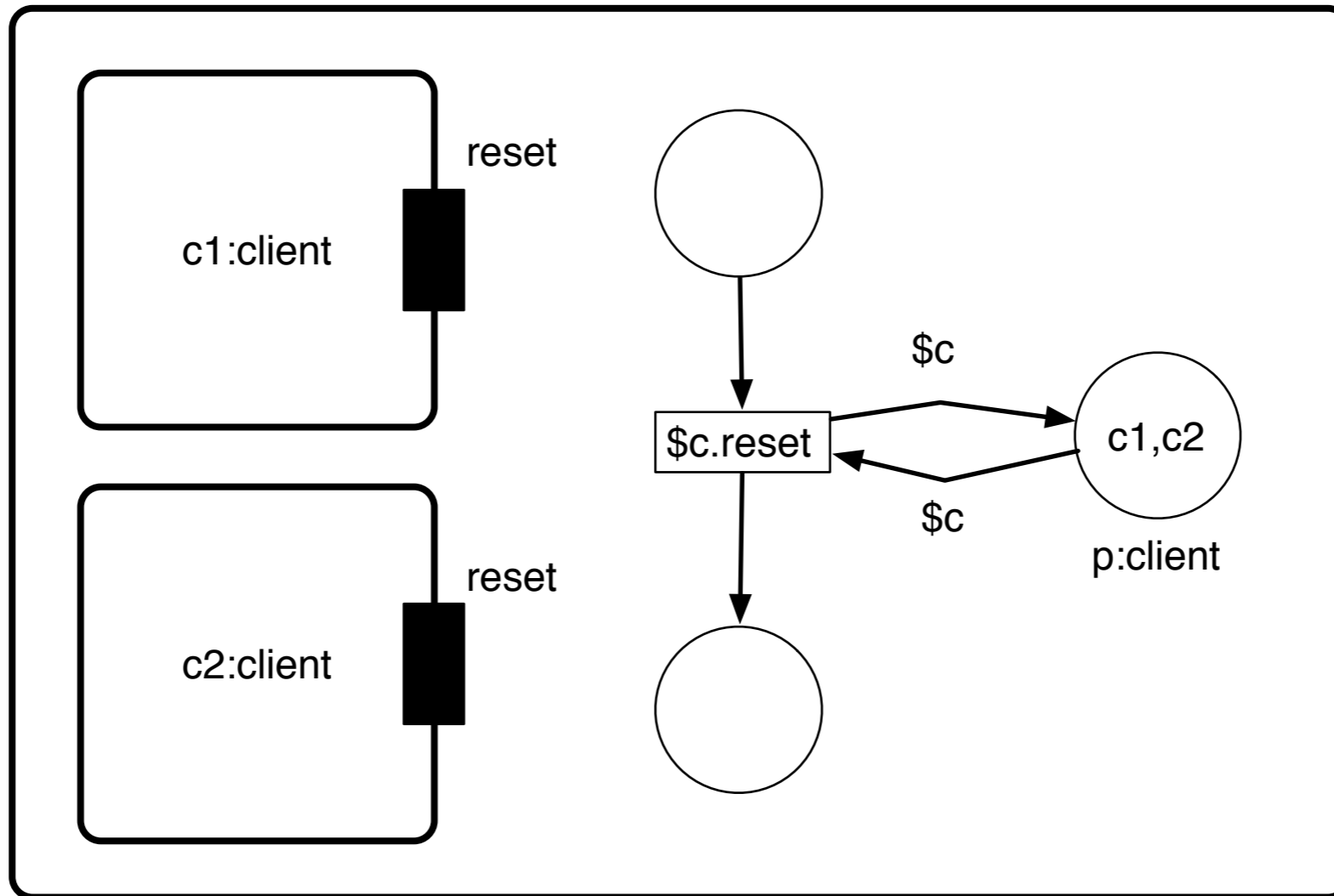
Dynamic instantiation

Object-orientation

} Nets within nets







Nets within nets

CO-OPN

OCP-nets

Communicating Object Petri nets

CLOWN

CoOperative objects

Object Petri nets

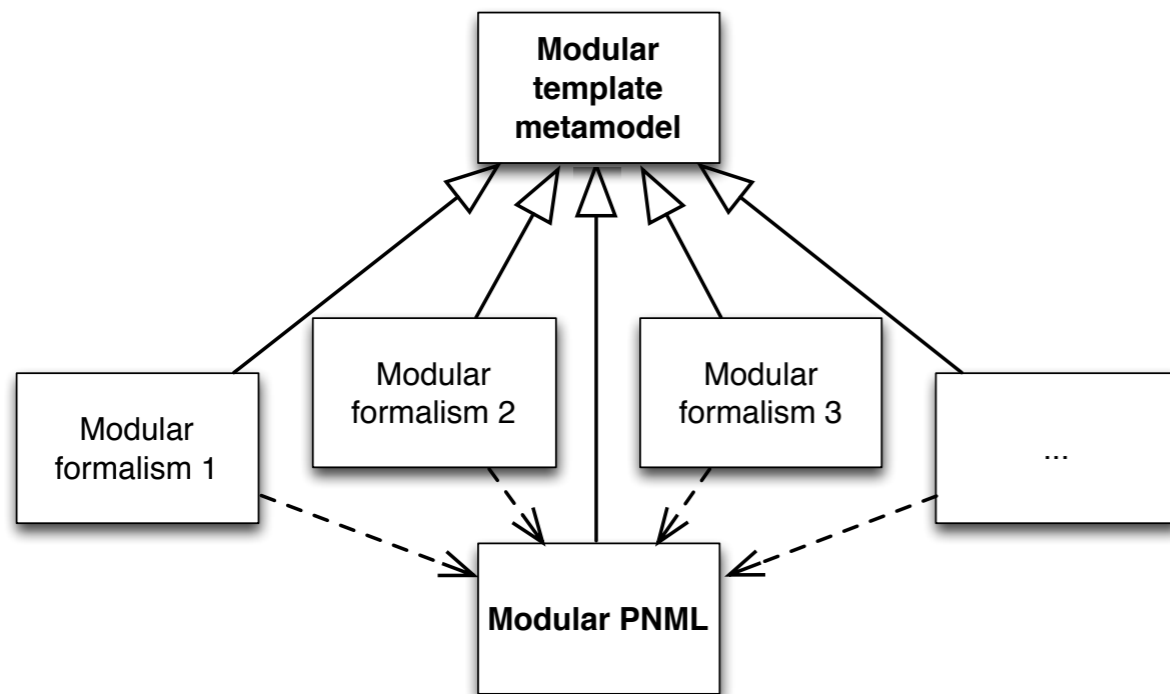
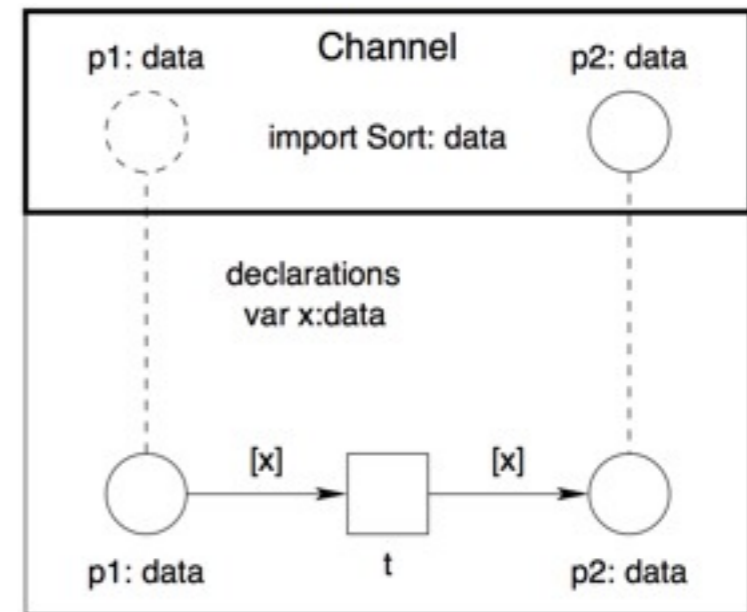
...

Nets within nets

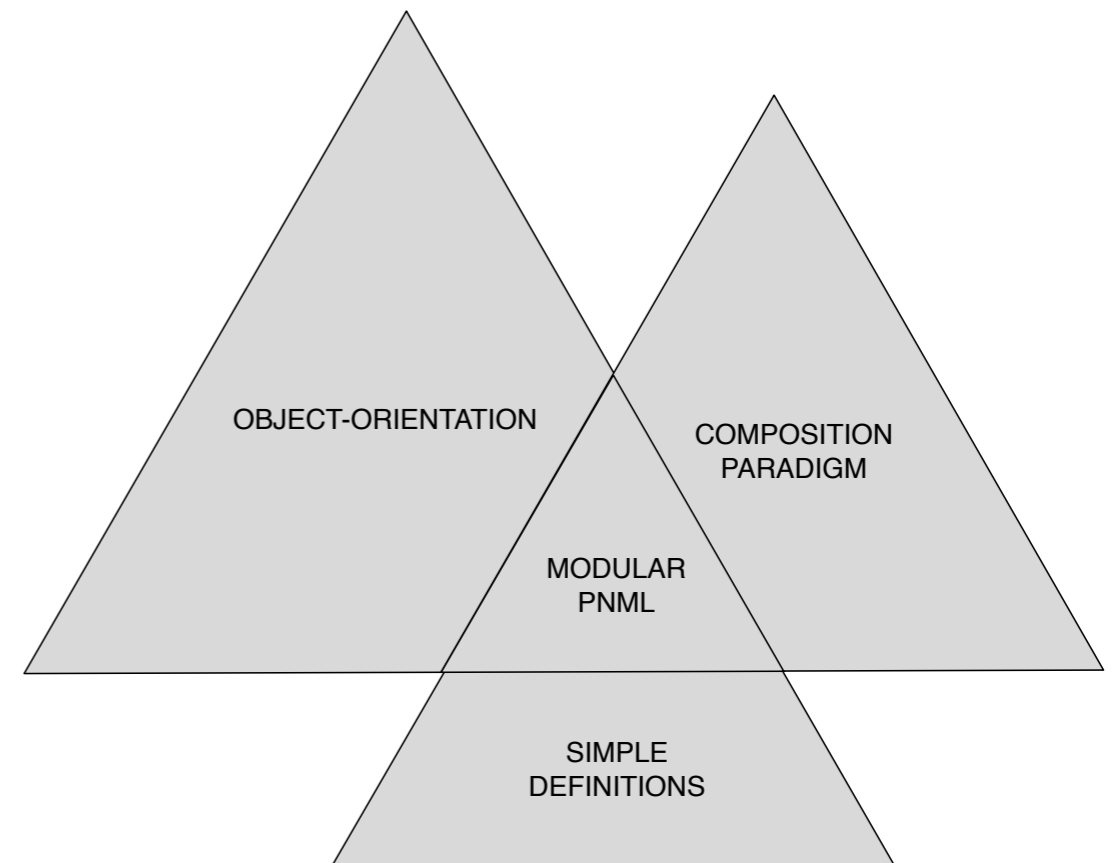
Outline



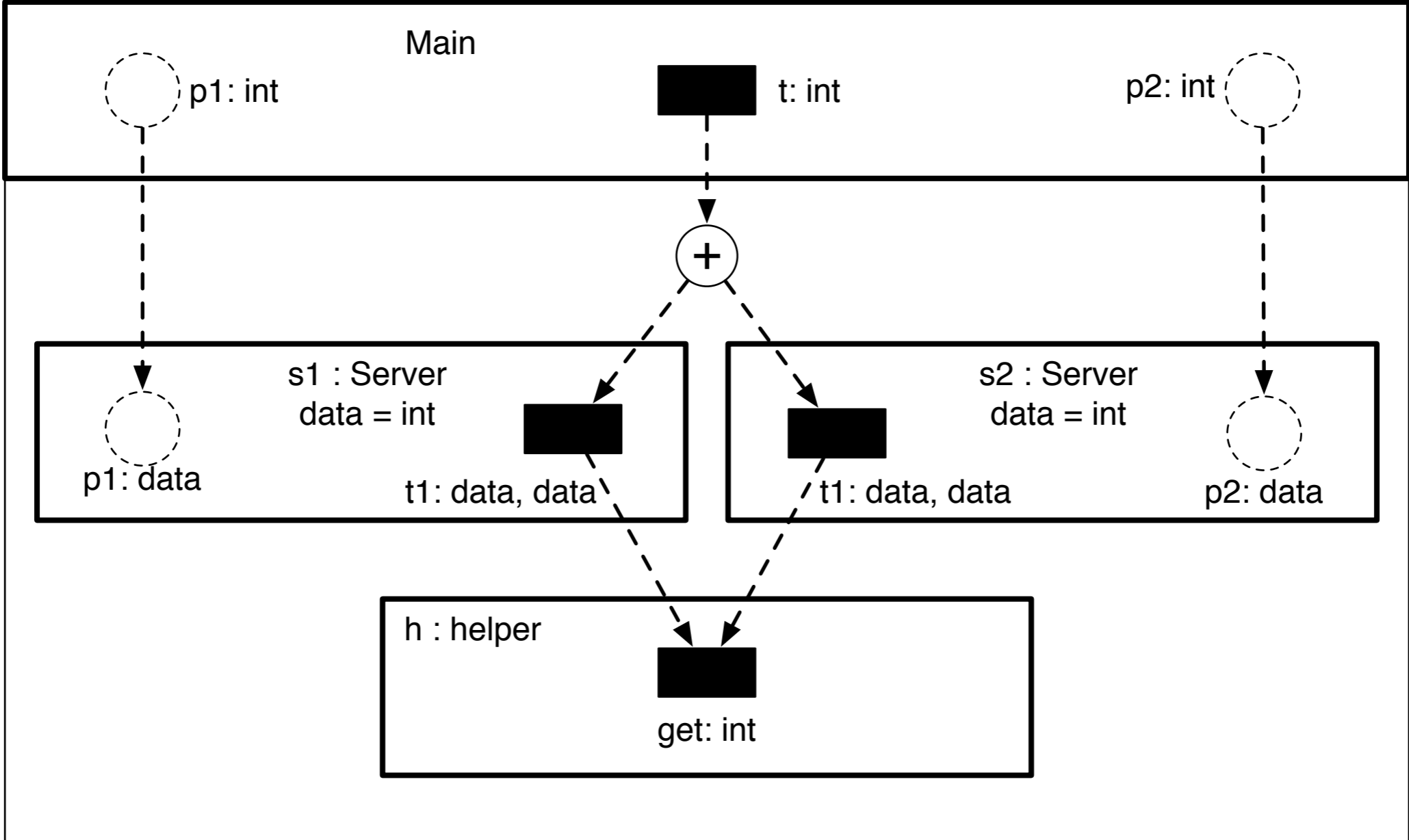
Scope

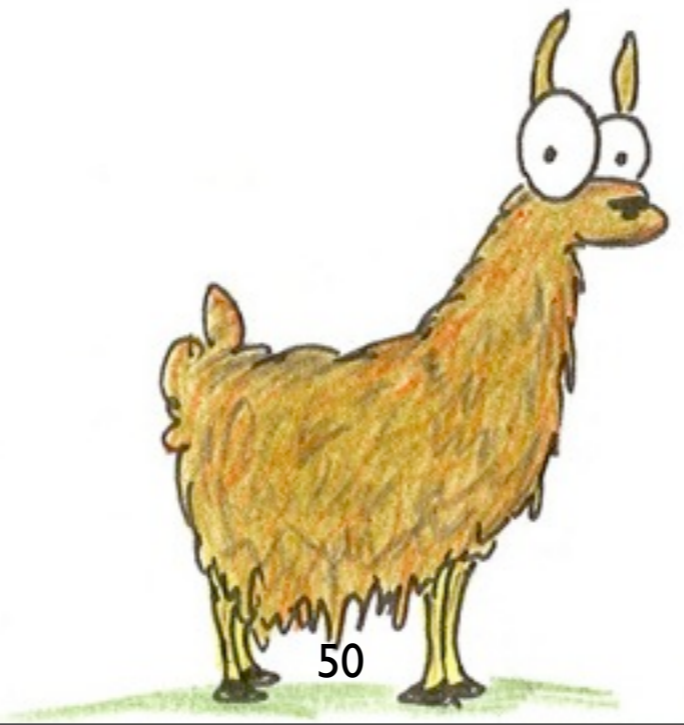
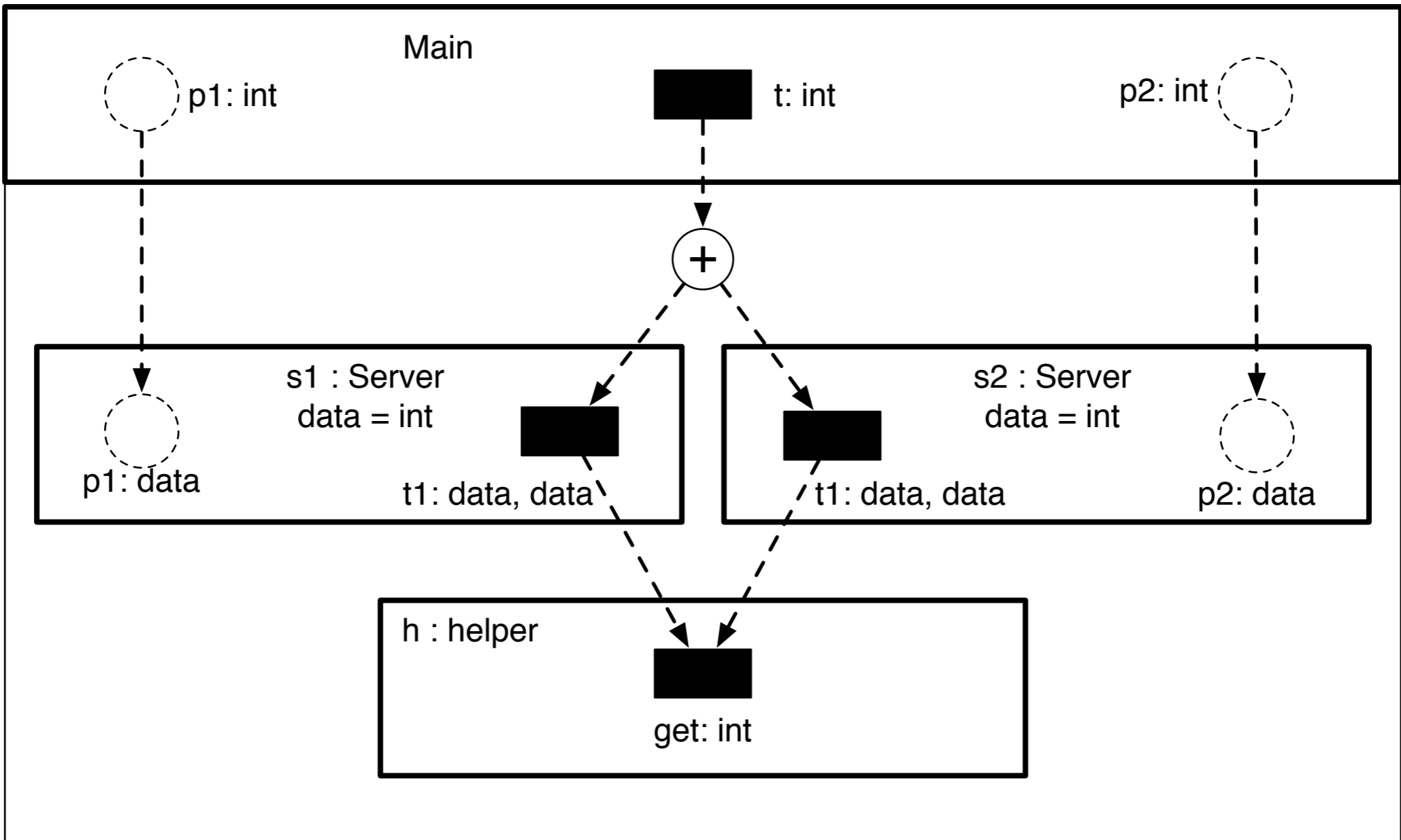


Methodology



Extensions





HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)



xkcd.com