From Constraints to Application Conditions

Presentation

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06/02/2017

Fundamentals of Model-Driven Engineering
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Introduction

Why do we want to construct application conditions from constraints?

- model transformation system containing sets of rules and constraints
- need to ensure: graph after rule application does not violate a constraint
- idea: construct application conditions to ensure this (checked before rule application)
- regeneration after changes in rules / constraints necessary
  $\Rightarrow$ construction needs to be automatized

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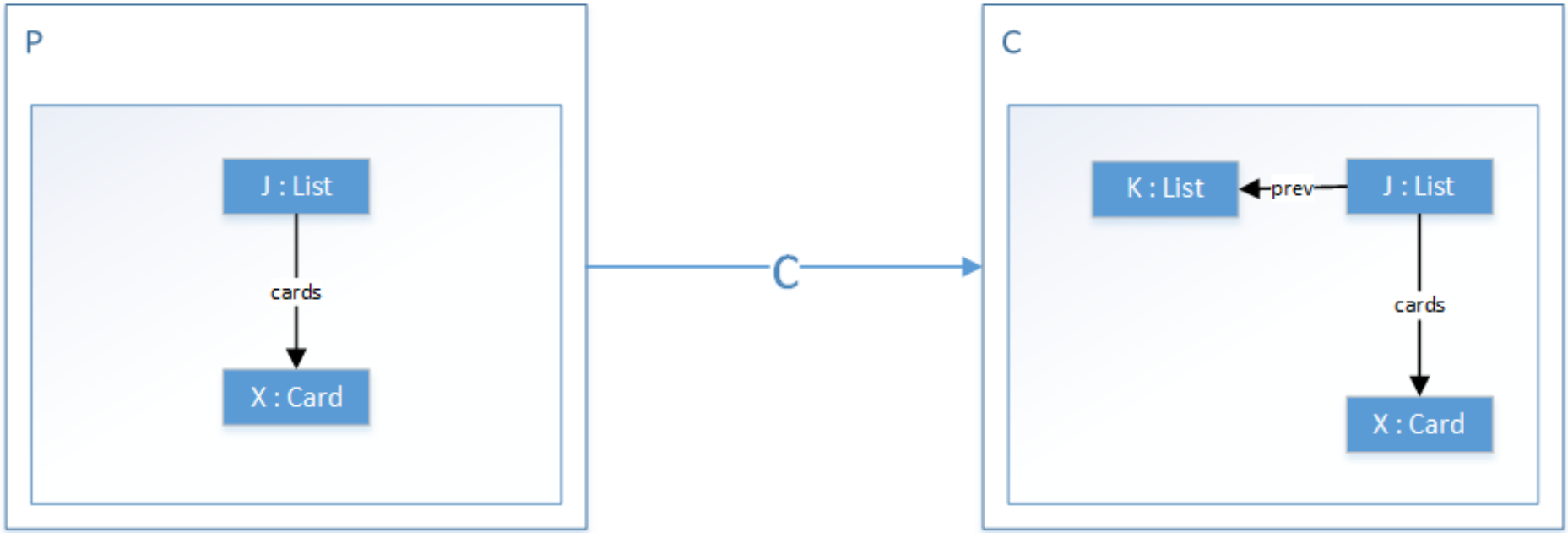
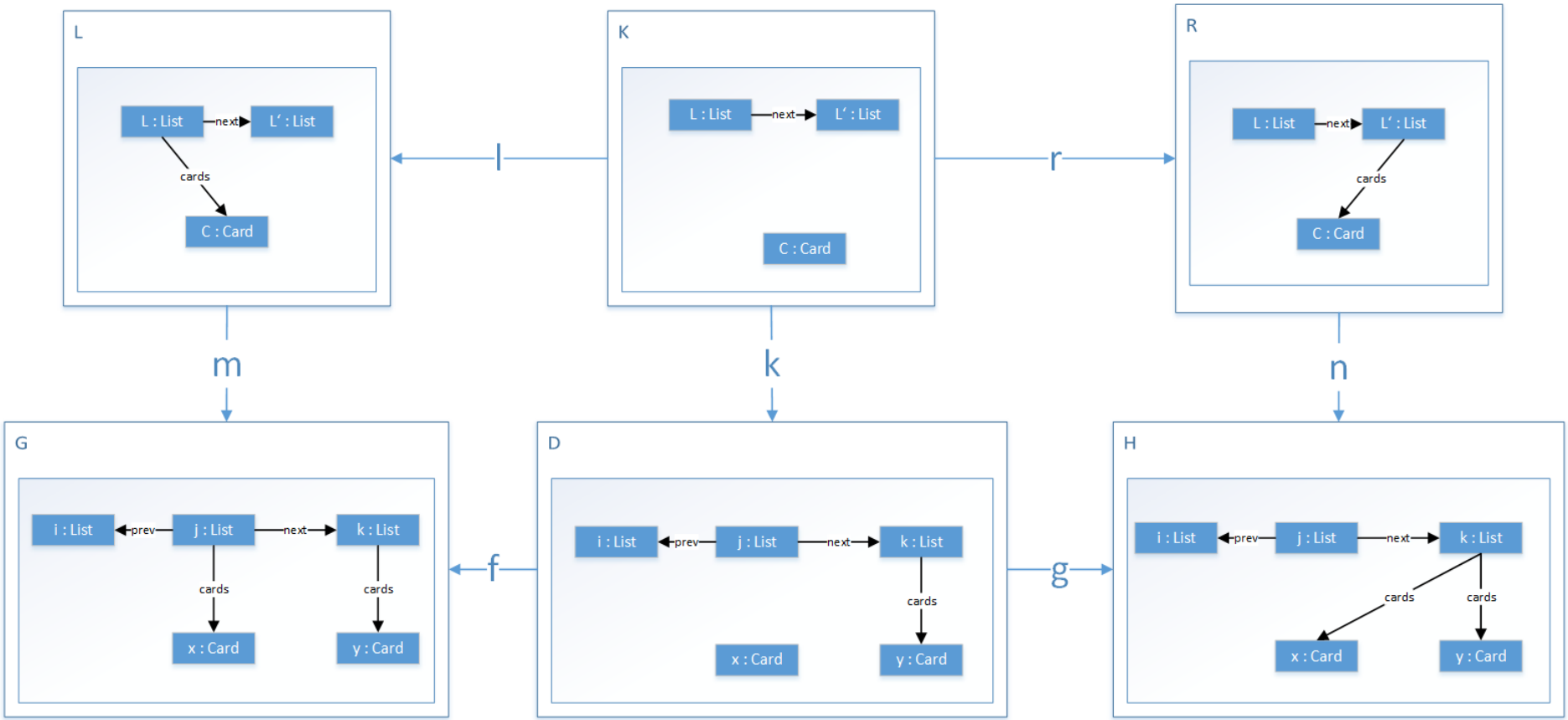
Introduction

Constraint Example: Each List J with a card X has a previous list K



Introduction

Rule Example: Moving Card C from List L to L'



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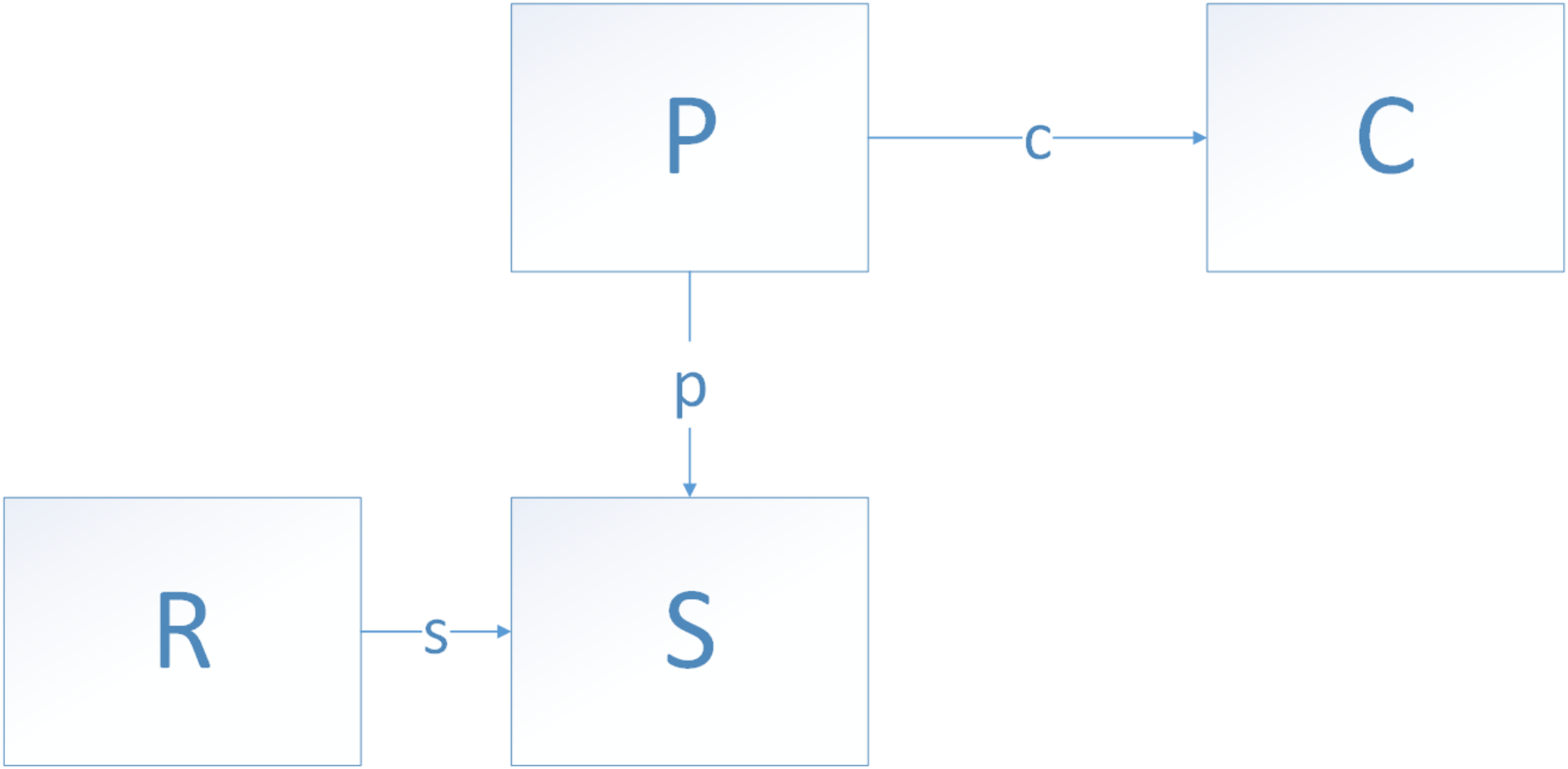
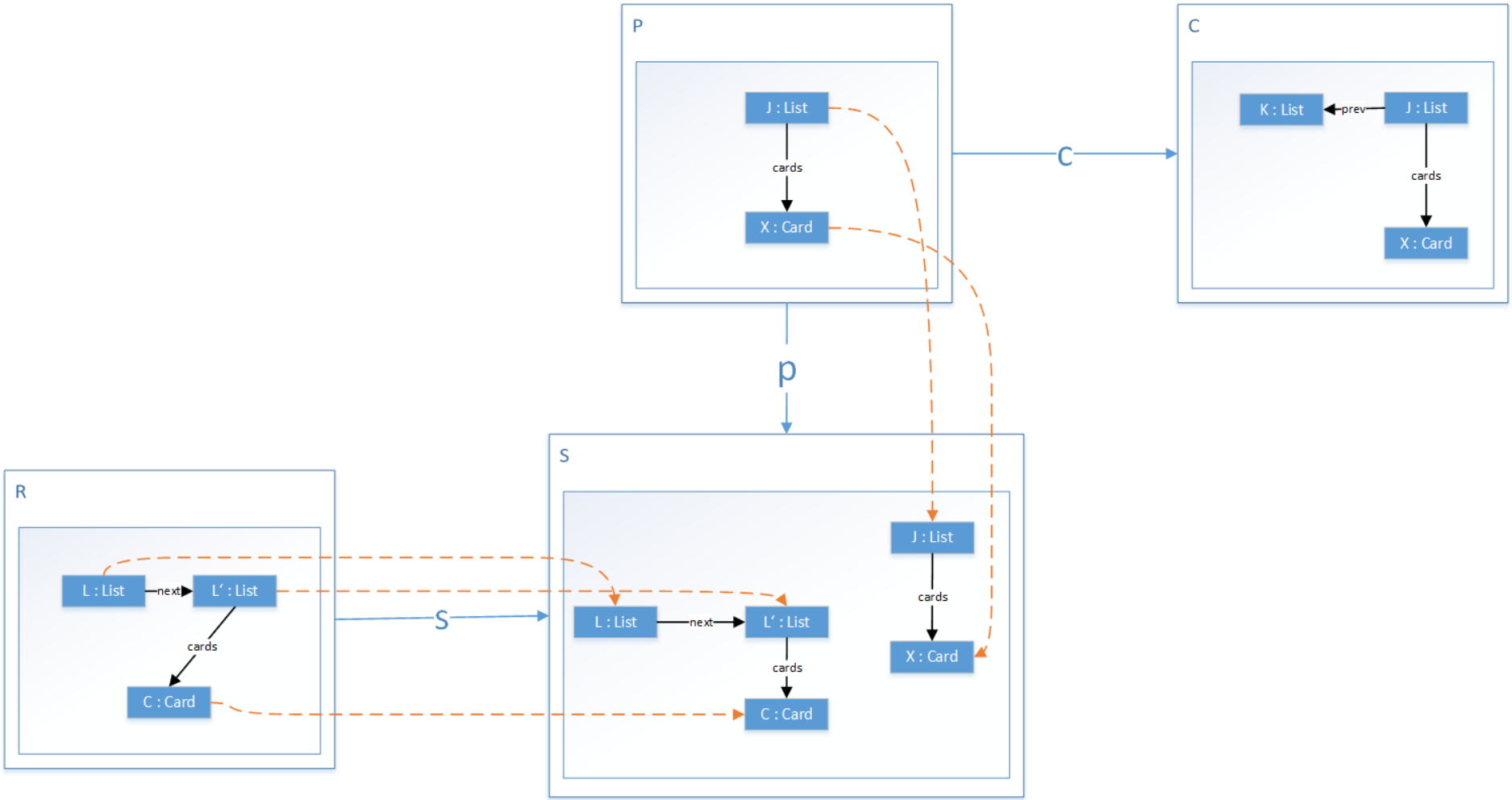
Construction of Application Conditions from Constraints

Construct possible epimorphic gluings S – Schema



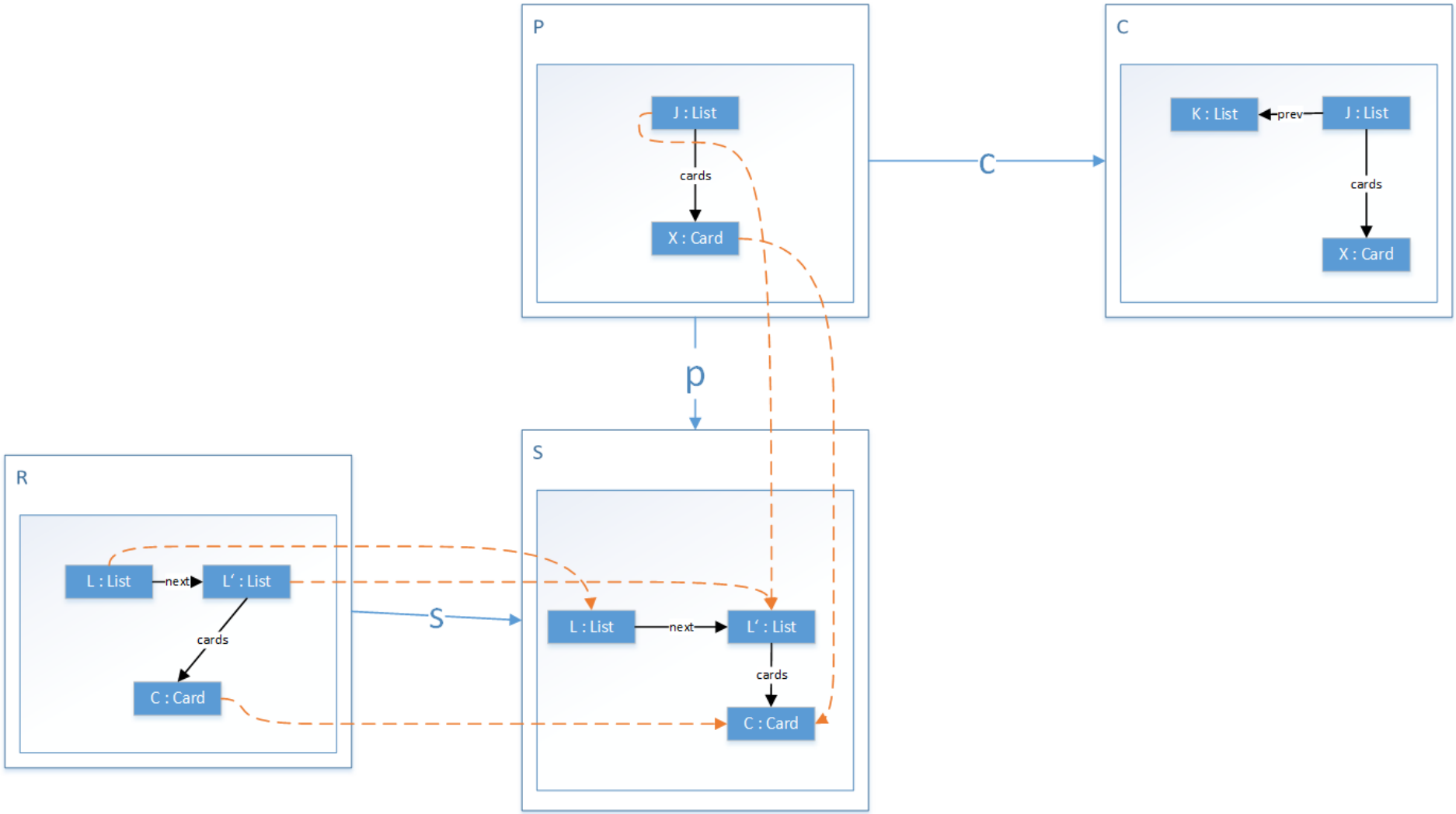
Construction of Application Conditions from Constraints

Construct possible epimorphic gluings S – Example Step 1



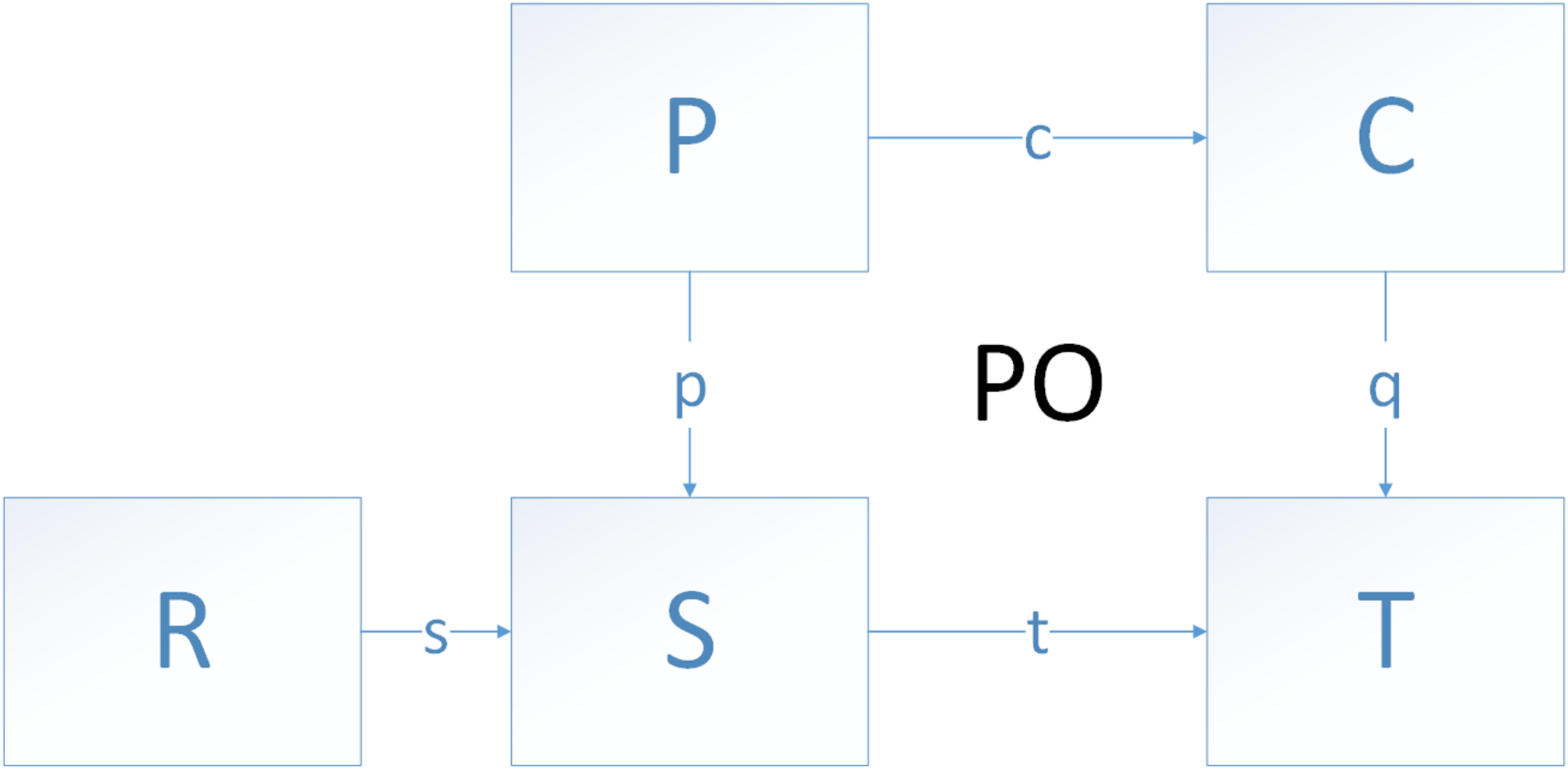
Construction of Application Conditions from Constraints

Construct possible epimorphic gluings S – Example Step 2



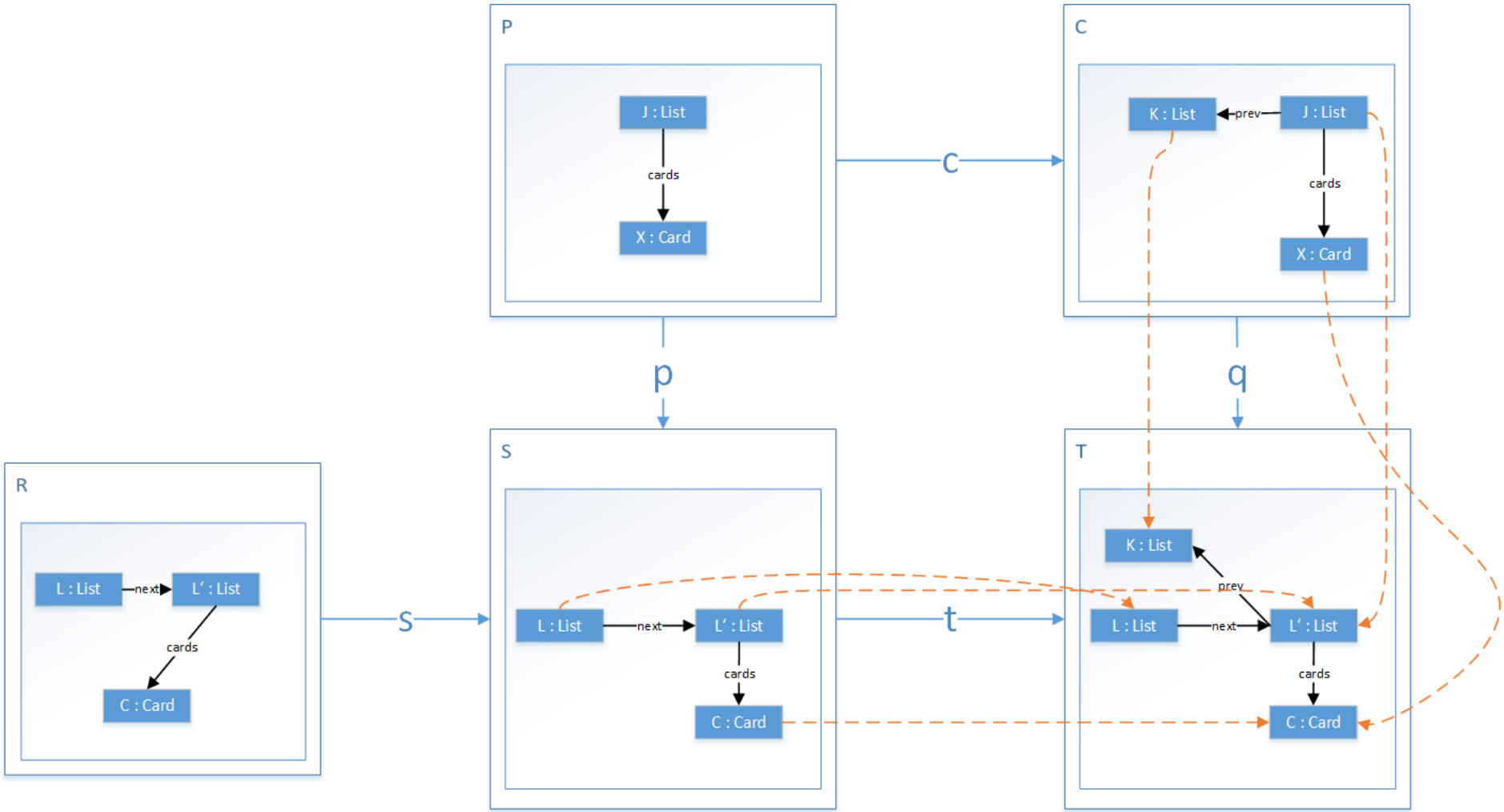
Construction of Application Conditions from Constraints

Construct pushout T – Schema



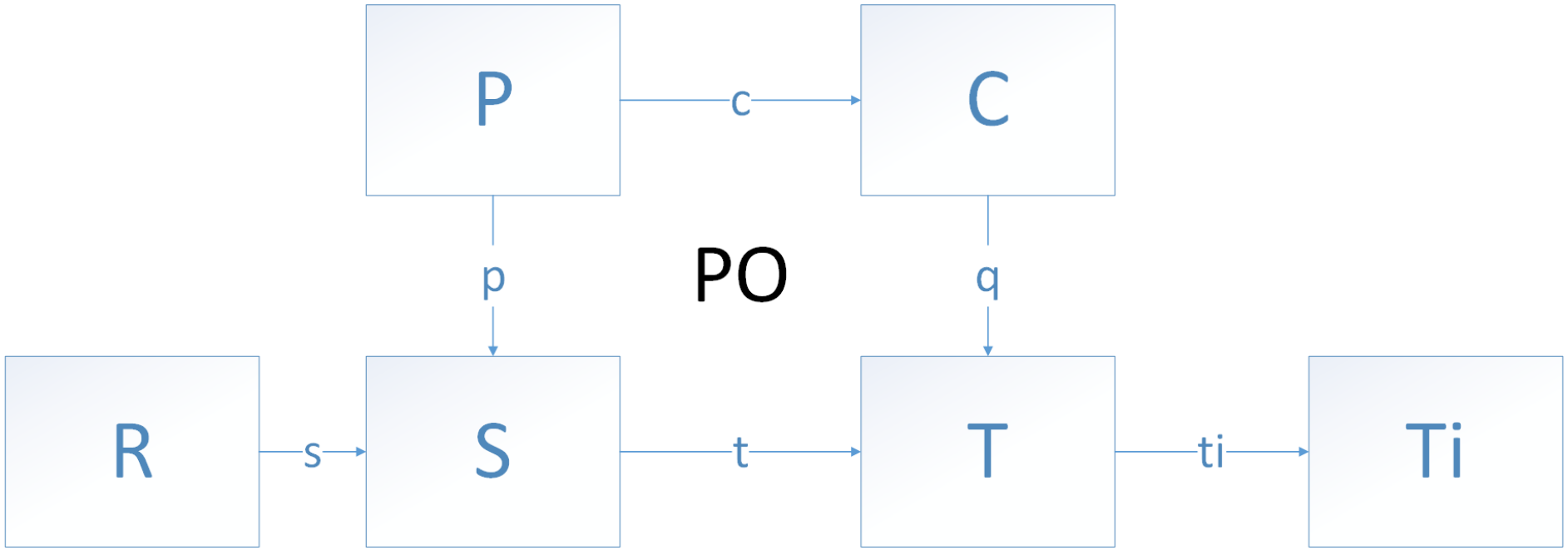
Construction of Application Conditions from Constraints

Construct pushout T – Example



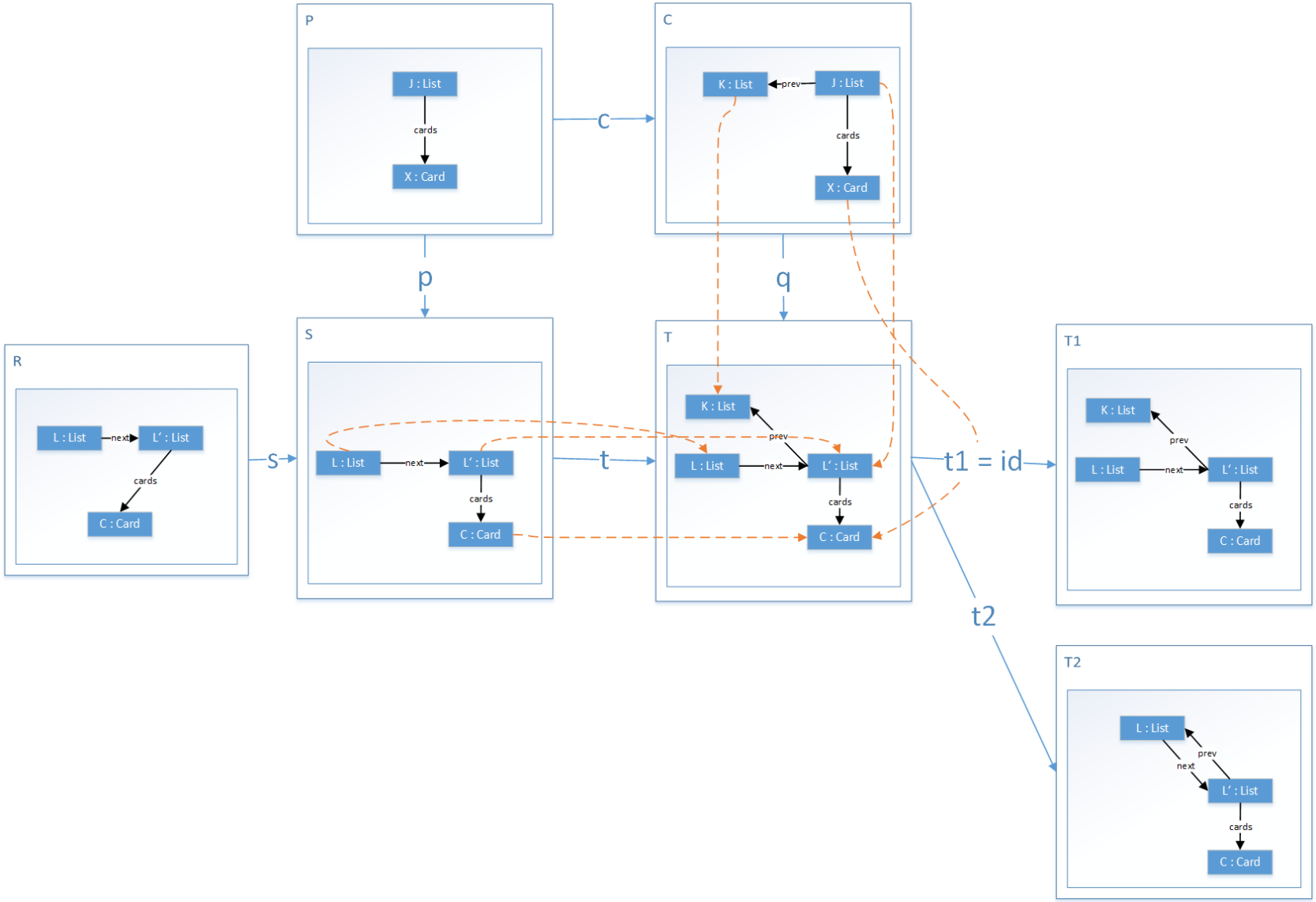
Construction of Application Conditions from Constraints

Construct epimorphic gluings T_i – Schema



Construction of Application Conditions from Constraints

Construct epimorphic gluings T_i – Example



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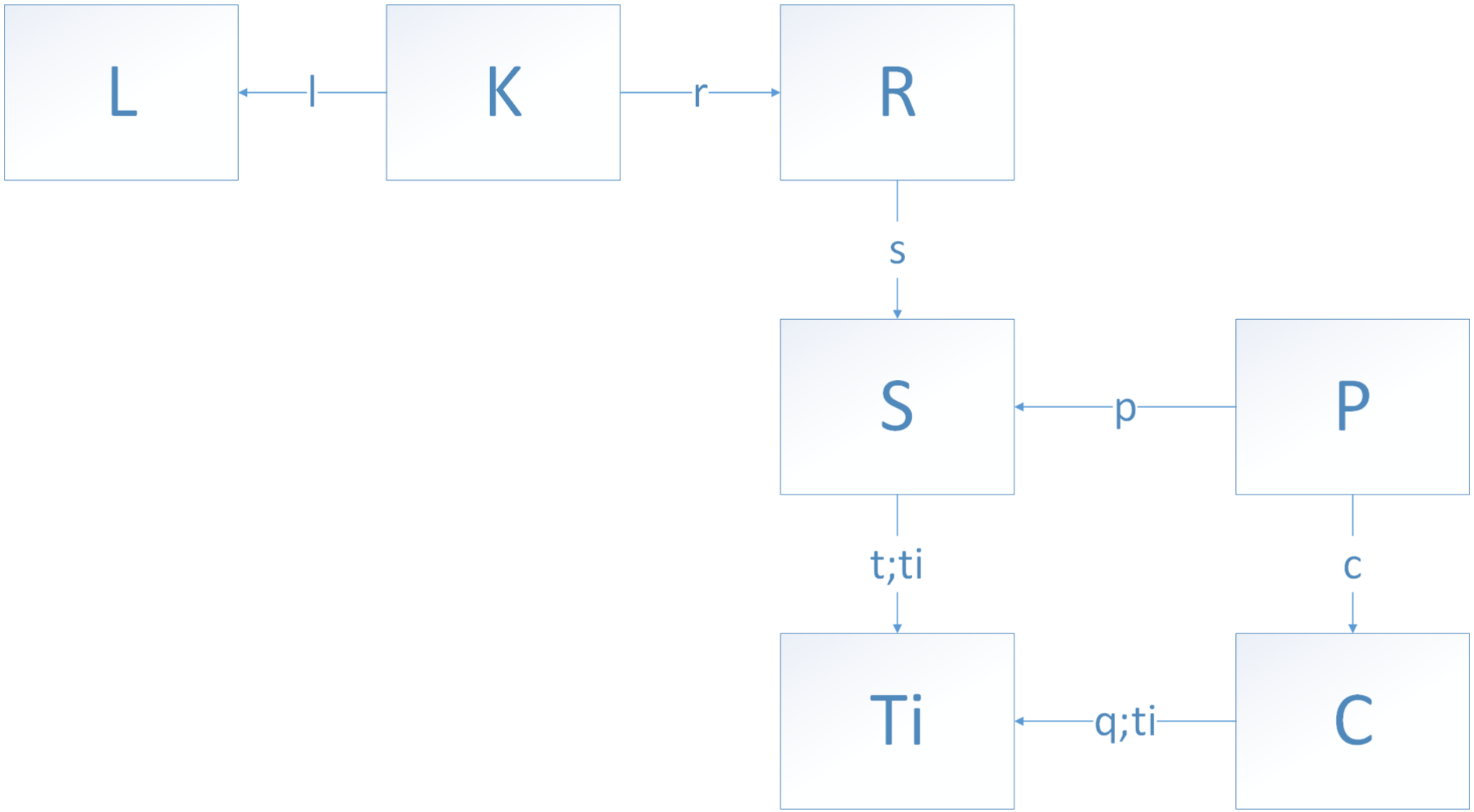
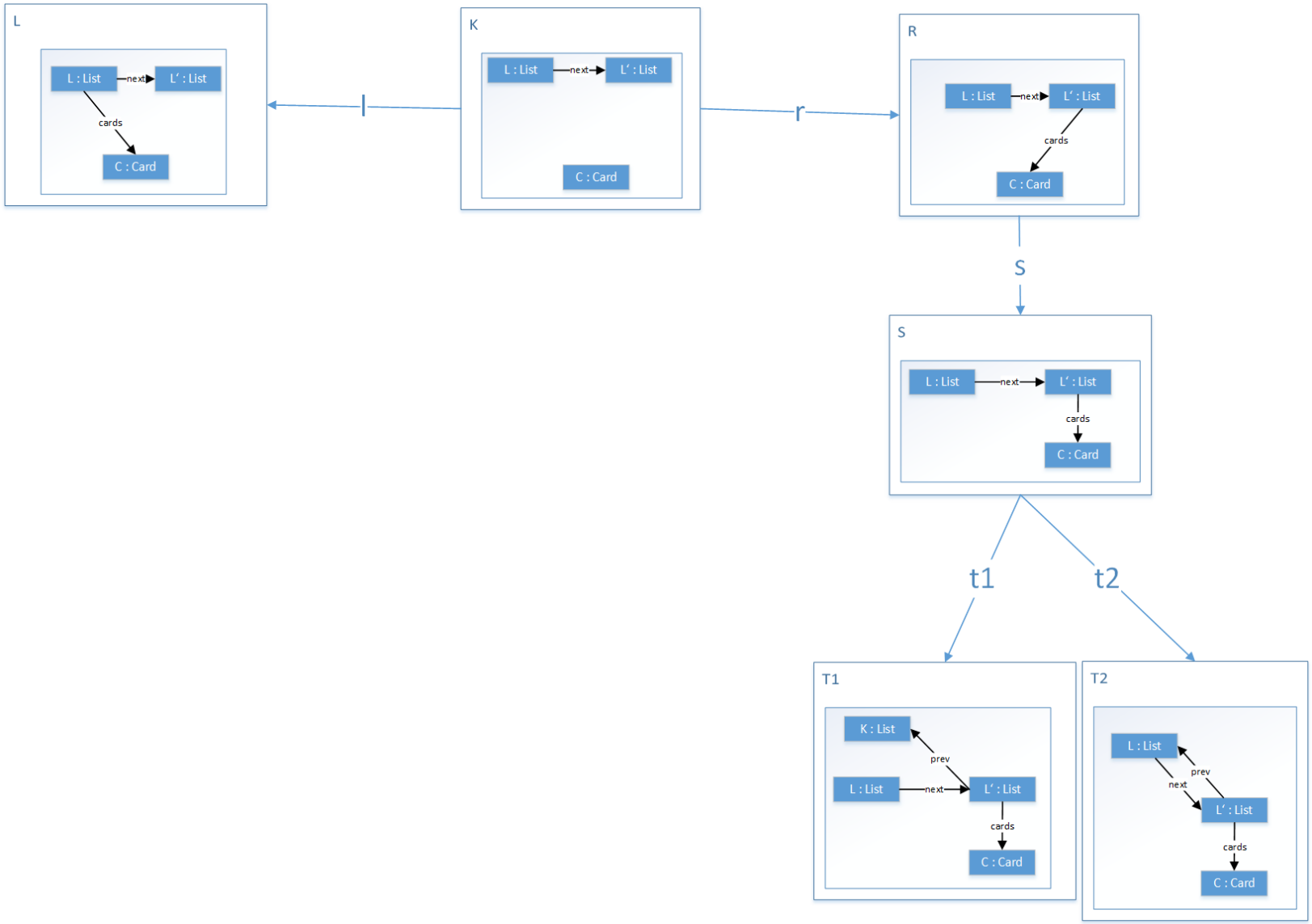
Construction of Left from Right Application Conditions

What we have done so far: Right Application Conditions



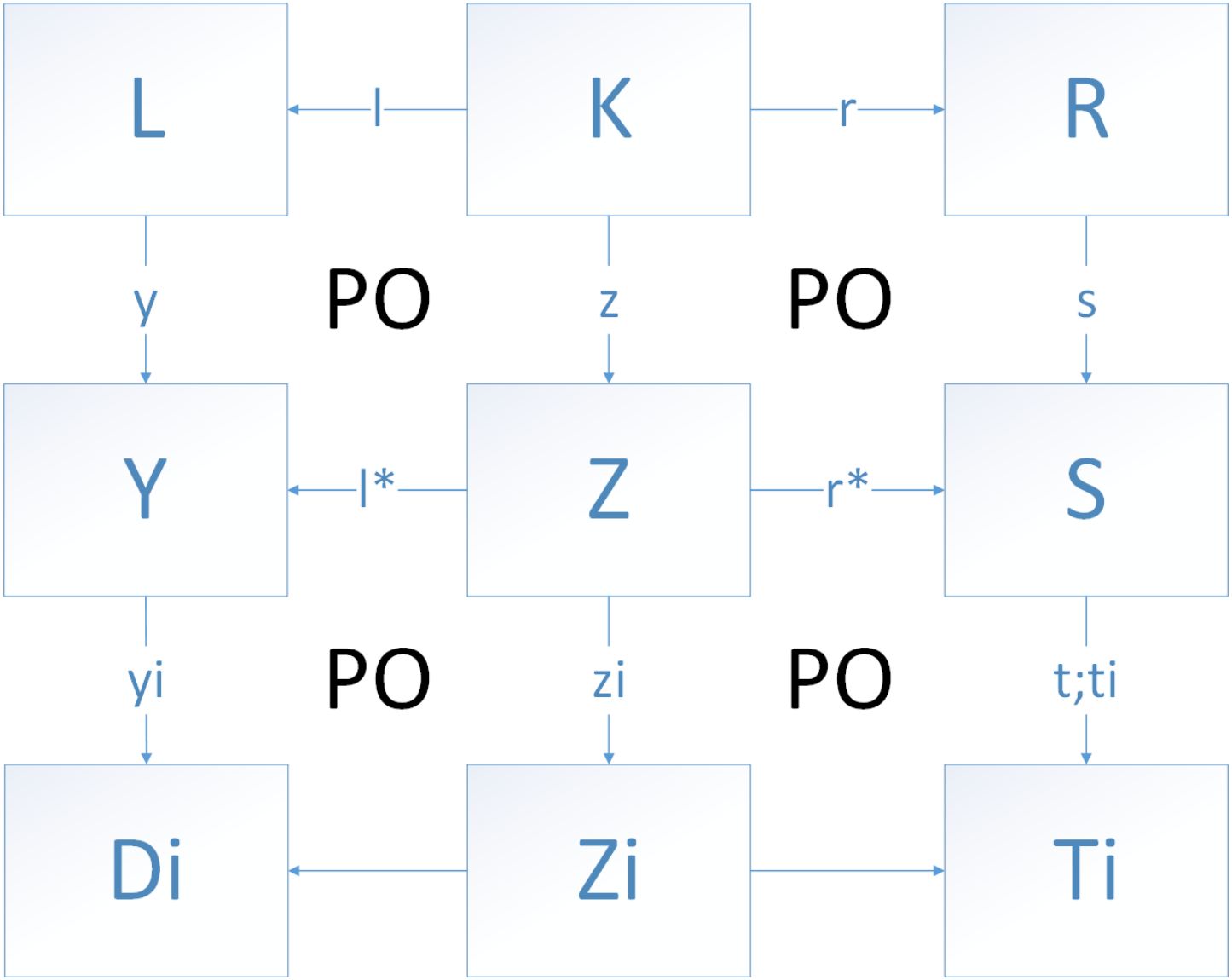
Construction of Left from Right Application Conditions

Right Application Condition – Example



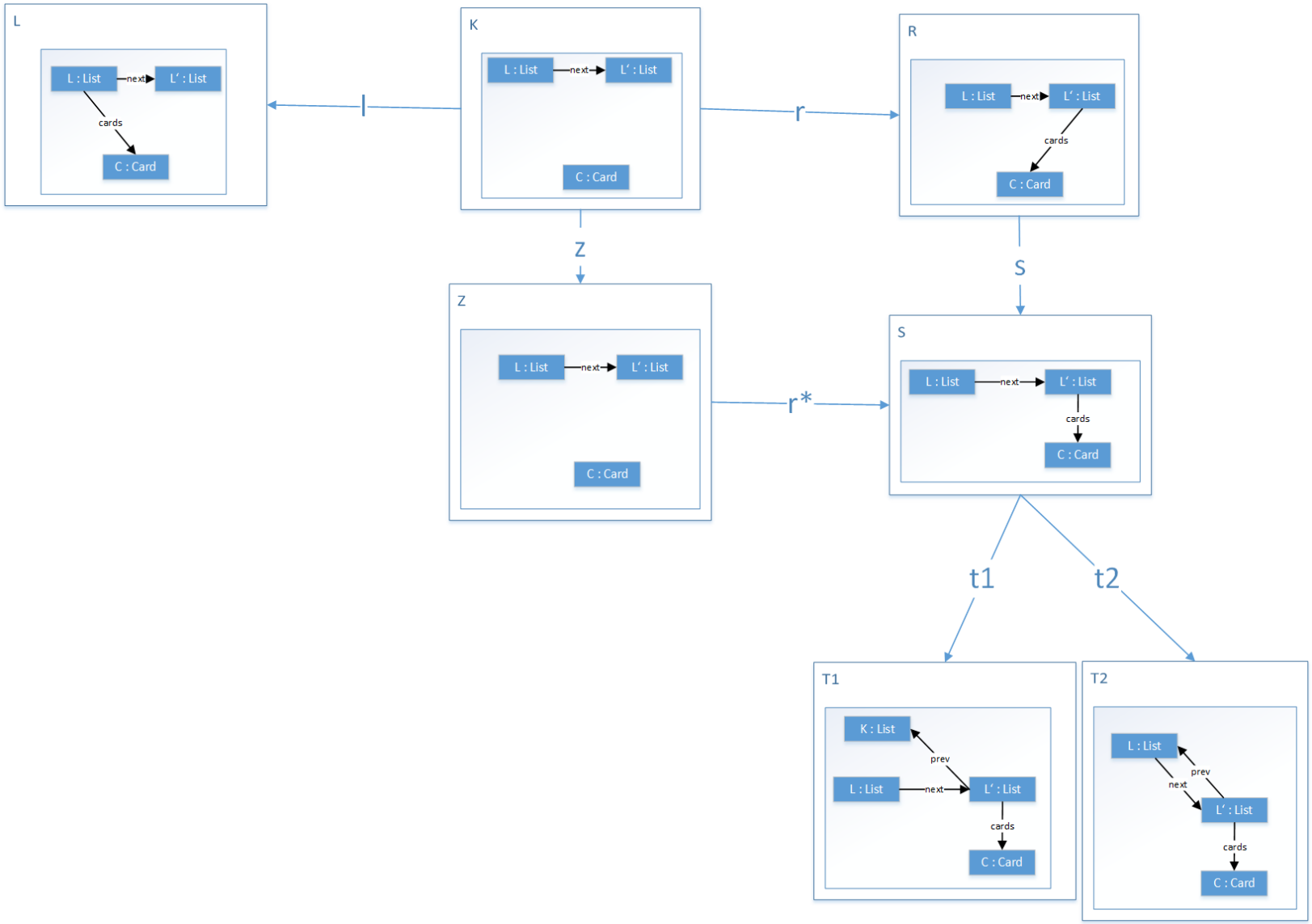
Construction of Left from Right Application Conditions

From Right to Left Application Conditions – Schema



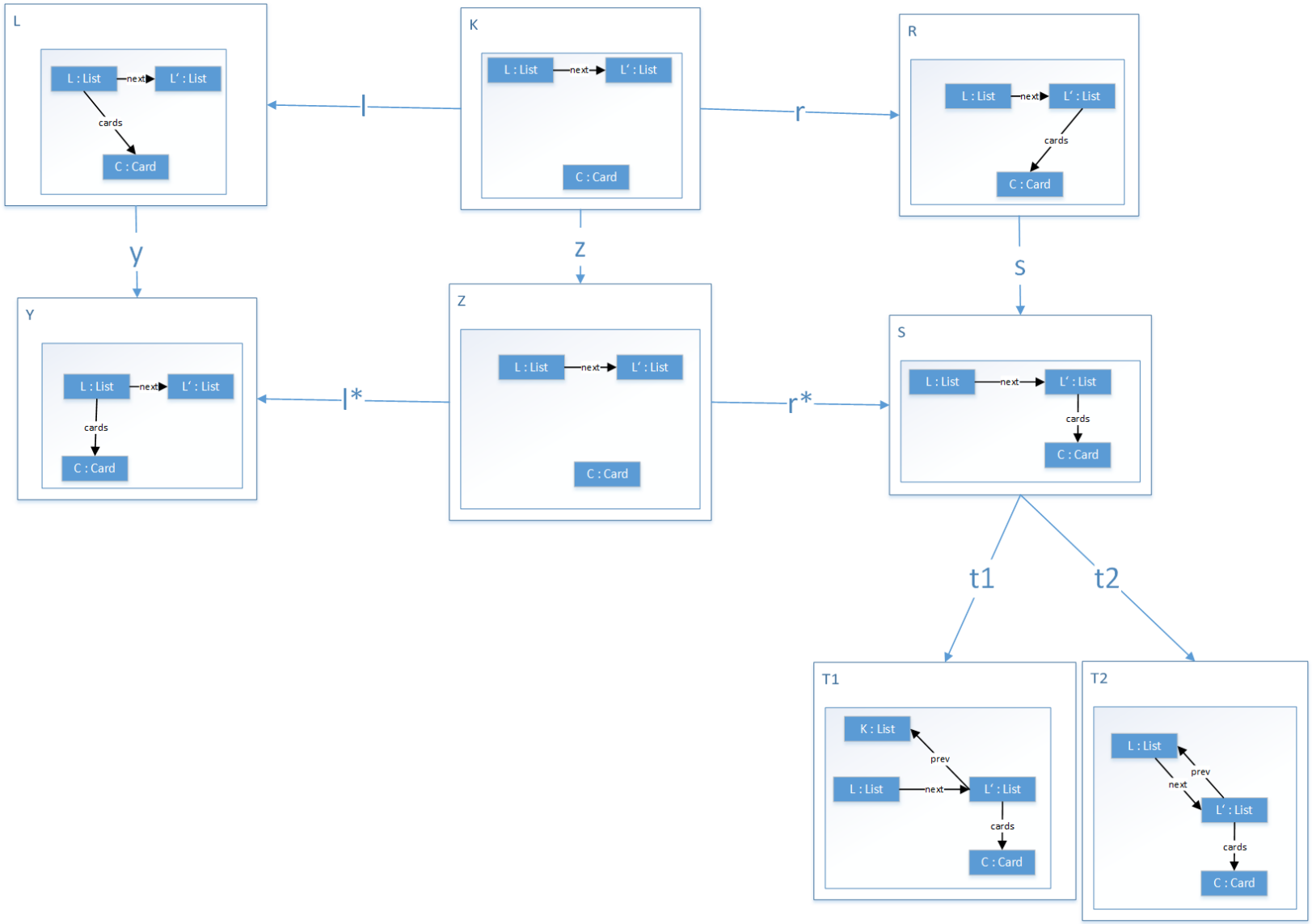
Construction of Left from Right Application Conditions

Construct pushout complement Z – Example



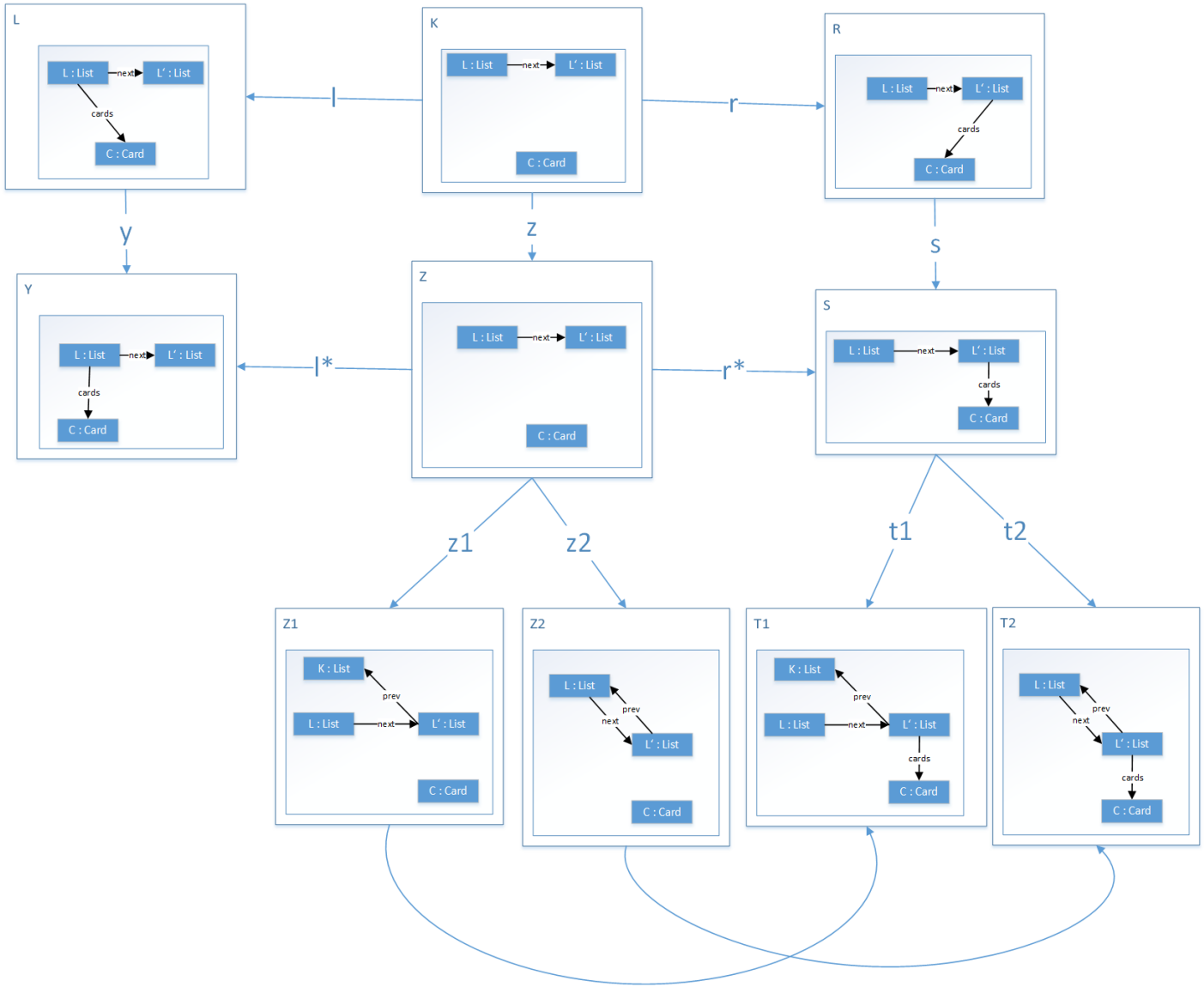
Construction of Left from Right Application Conditions

Construct pushout Y – Example



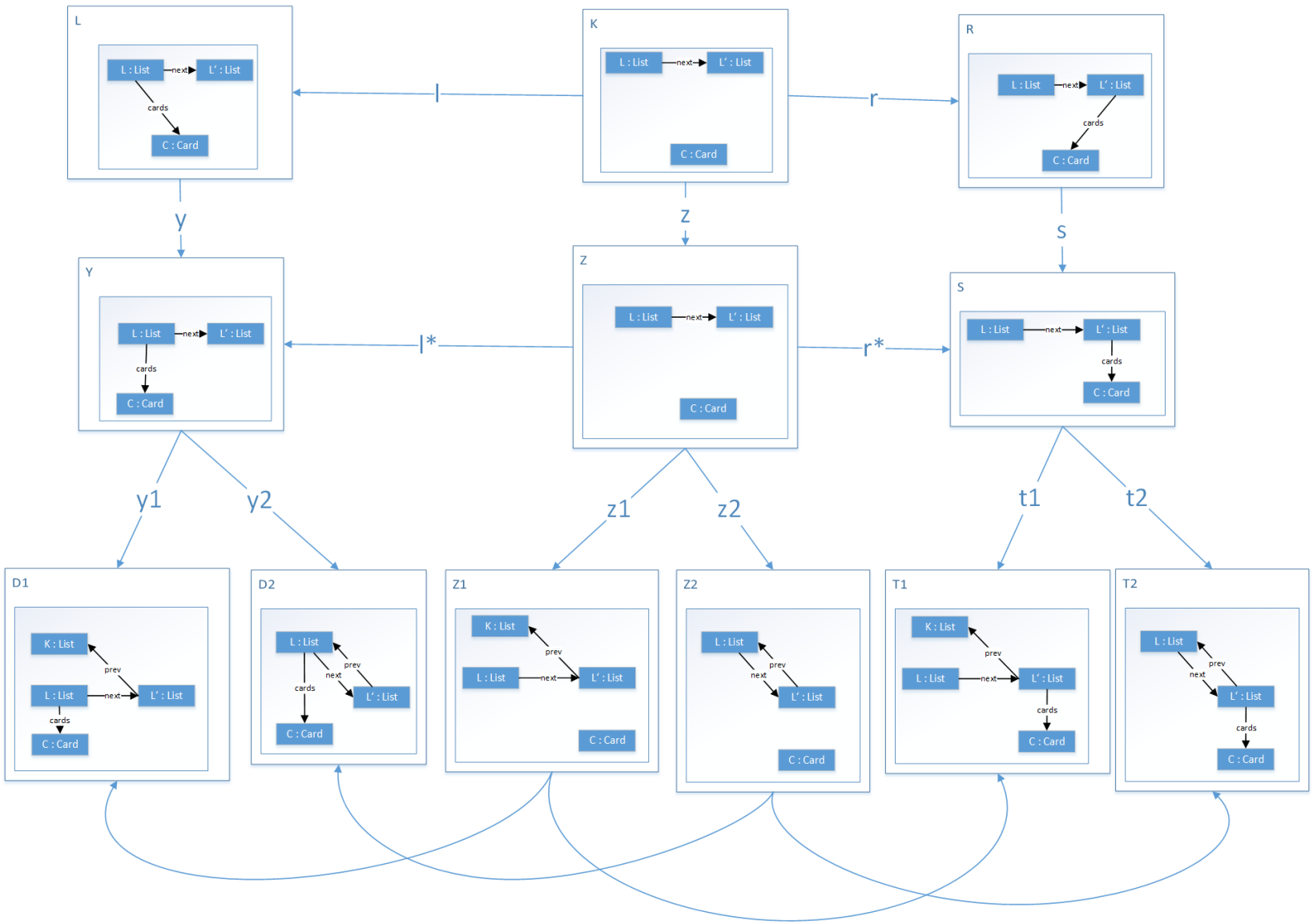
Construction of Left from Right Application Conditions

Construct pushout complements Z_i – Example



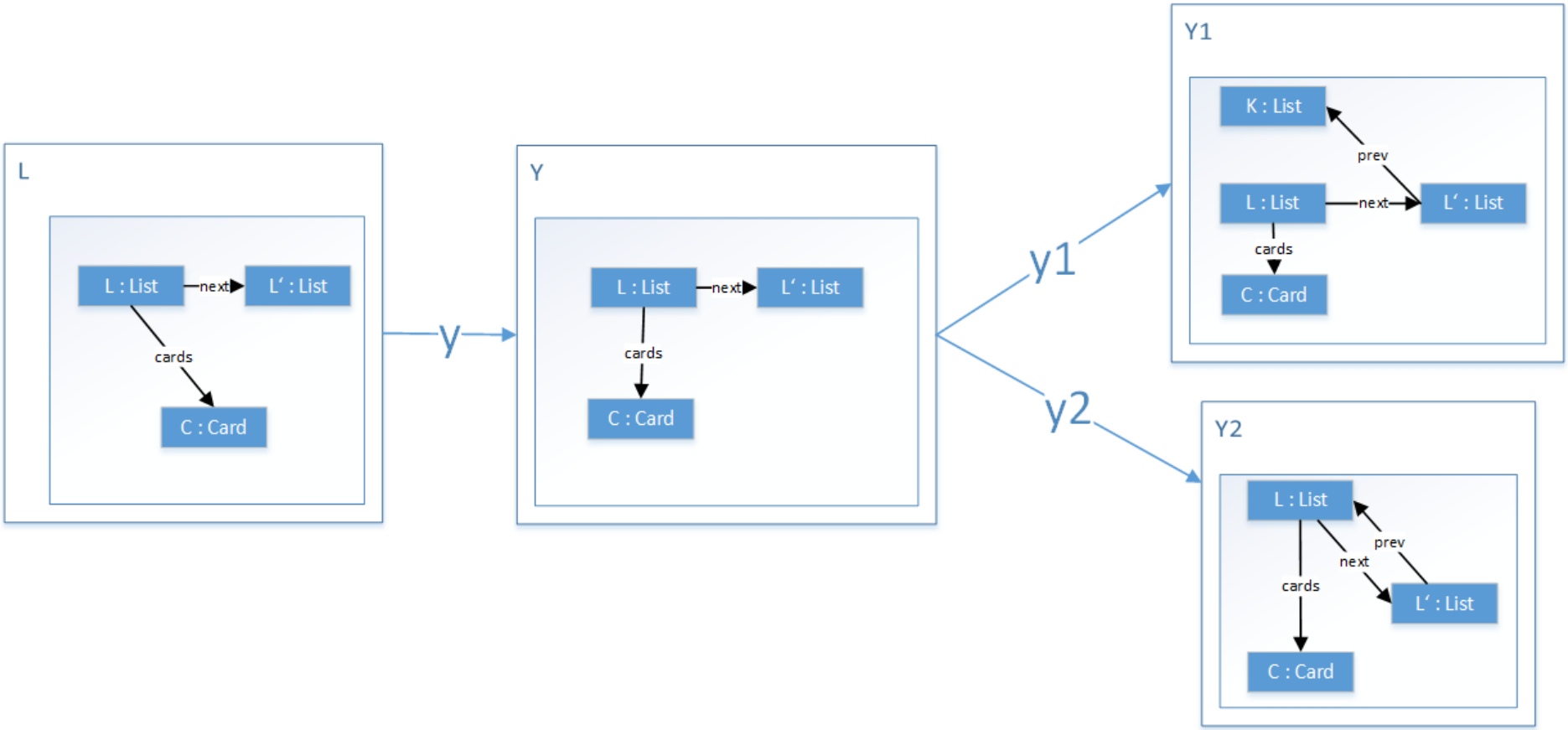
Construction of Left from Right Application Conditions

Construct pushout complement D_i – Example



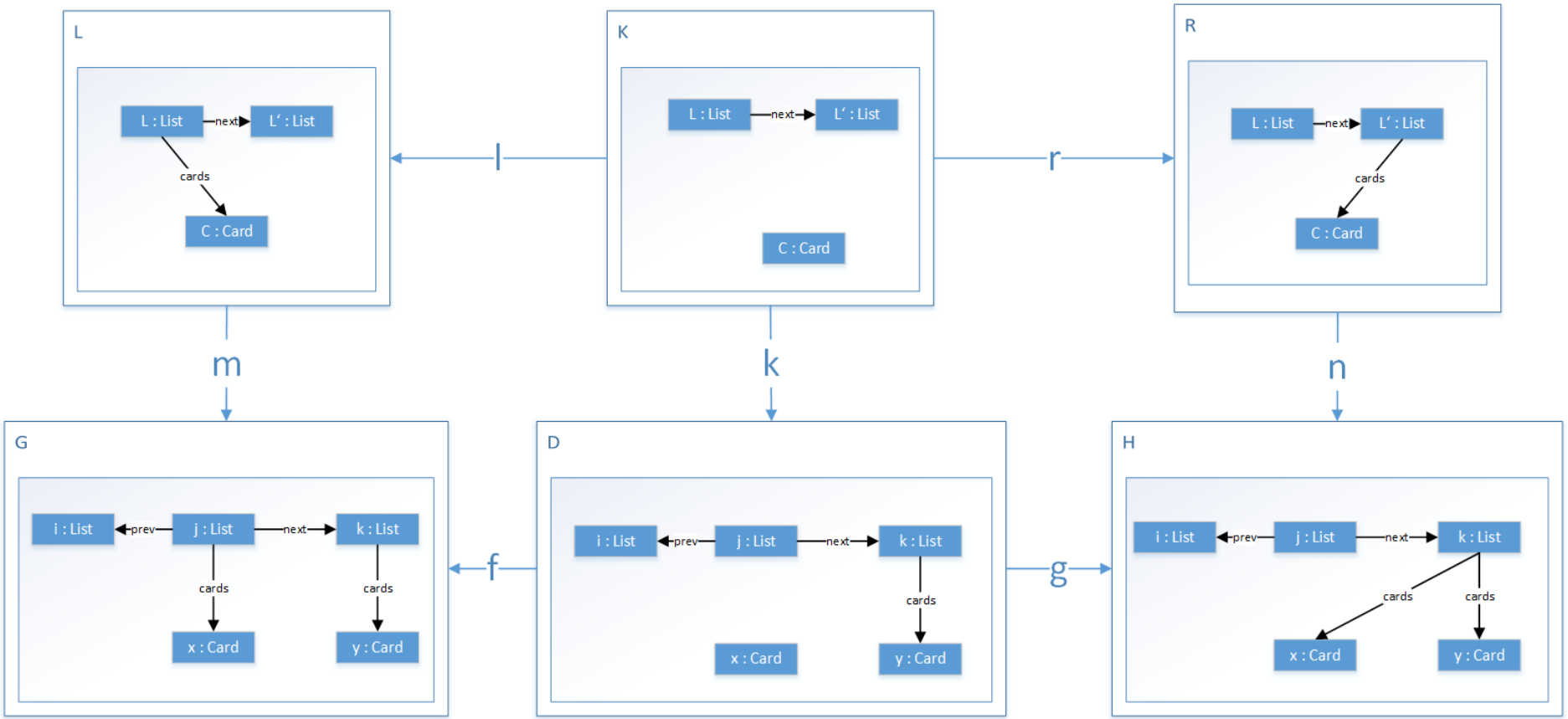
Construction of Left from Right Application Conditions

Left Application Condition – Example



Rule Application allowed?

Rule Example: Moving Card C from List L to L'



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Lessions Learned

Our implementation

- interesting topic, worth repeating with focus on current performance limitations
- The construction of applications conditions can be implemented with the code from the exercises
  - currently only implemented for $c : P \to C$ (not multiple conclusions)
  - Performance has to be improved for application on larger examples

Problems during implementation

- difficult to output diagrams in PlantUML as labels are used to identify objects in the diagrams (but there exist multiple objects with the same label) - only limited help for debugging
- choose left or right and first or second in corners/spans?

$\Rightarrow$ code generation from category diagrams would be great!