A Model of Database Components and their Interconnection Based upon Communicating Views

Stephen J. Hegner
Umeå University
Department of Computing Science
SE-901 87 Umeå, Sweden
hegner@cs.umu.se
http://www.cs.umu.se/~hegner

Managing the Complexity of Large-Scale Systems

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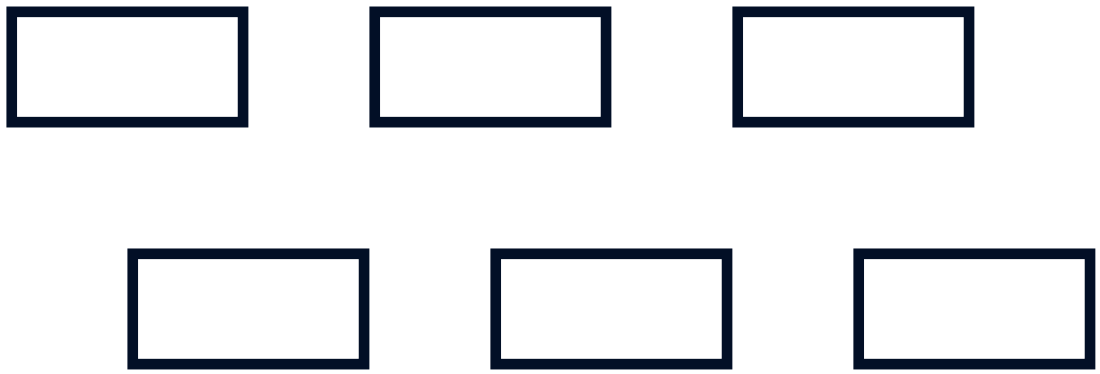

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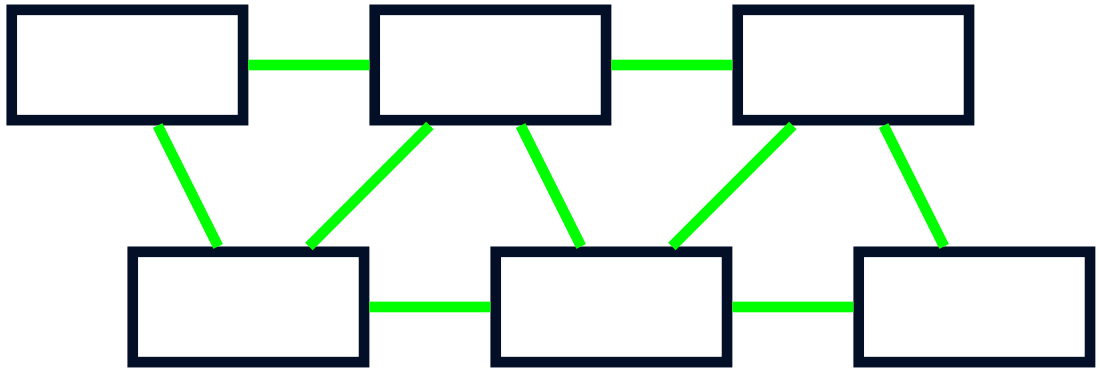

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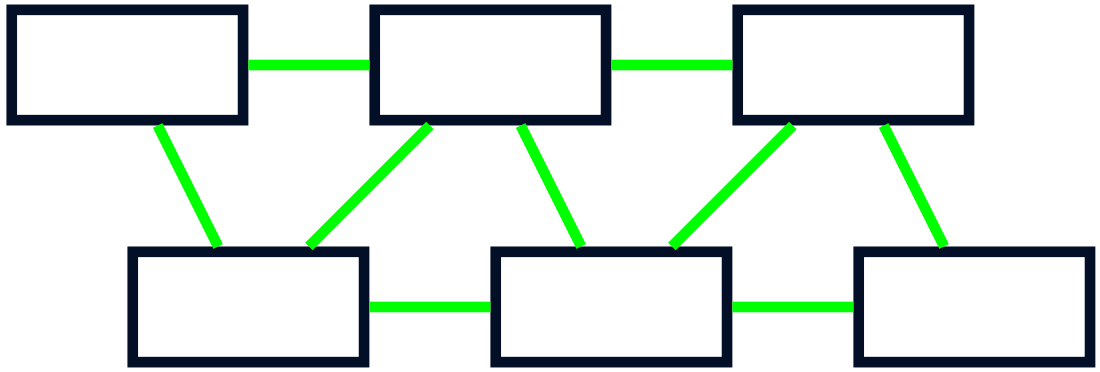

- This approach is standard for hardware systems.
- It is far less common for software systems.
- A reason is perhaps that software components are far less standard than hardware components.

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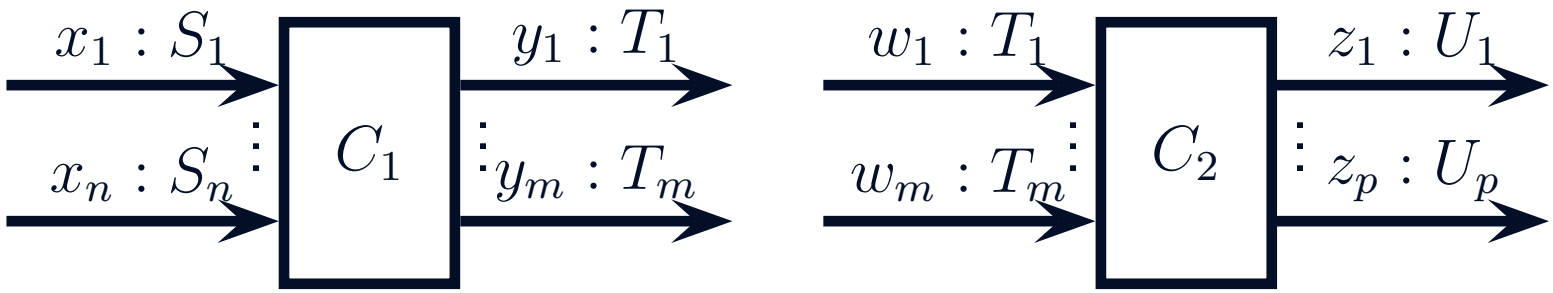

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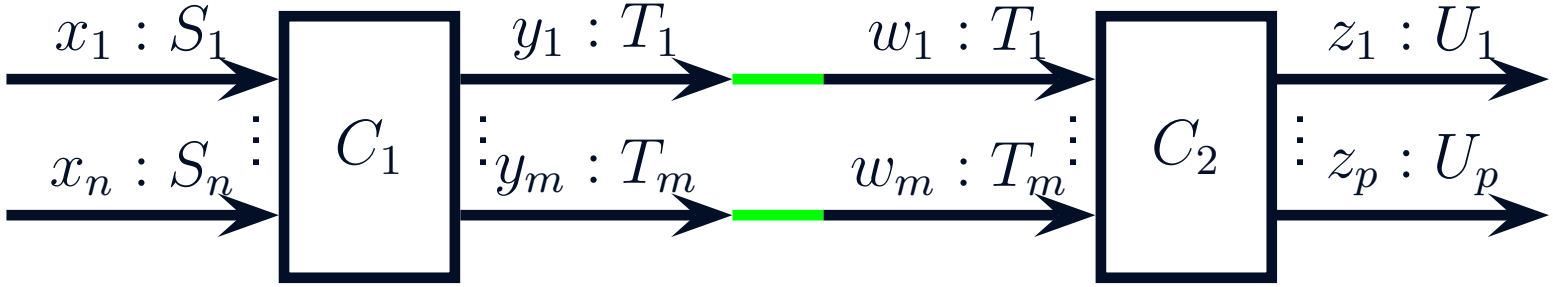

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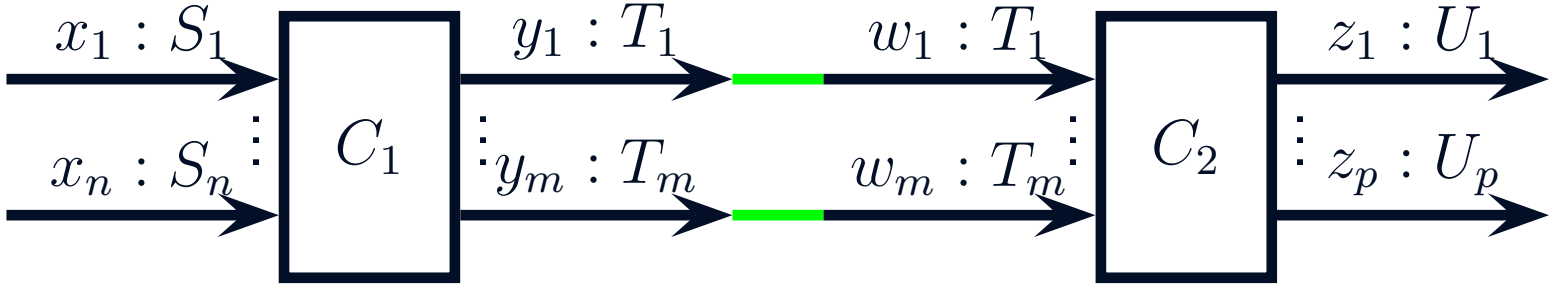

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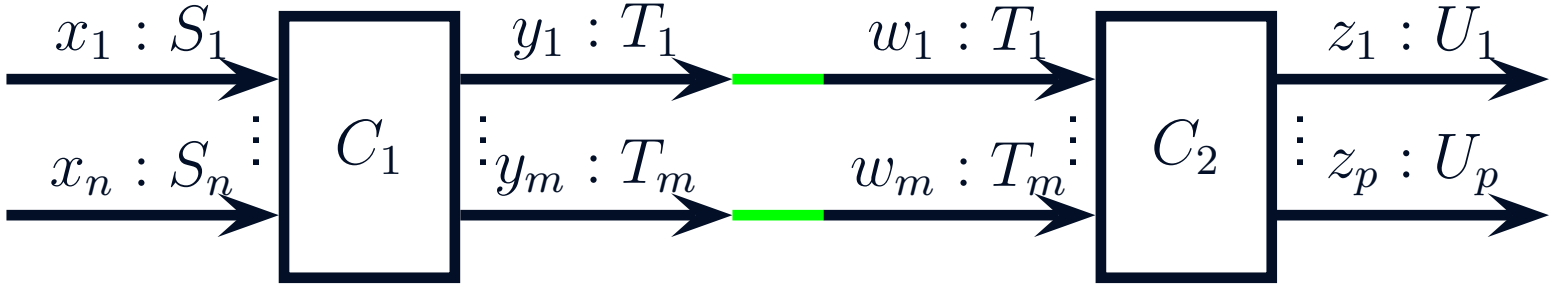

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- The channels are database views.
- This forces one to accept communication via streams of view states as the fundamental notion of communication between database components.

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- The theory should be flexible and not limited to a particular data model.
- Nevertheless, it should be firmly motivated by constructions in the classical relational model.

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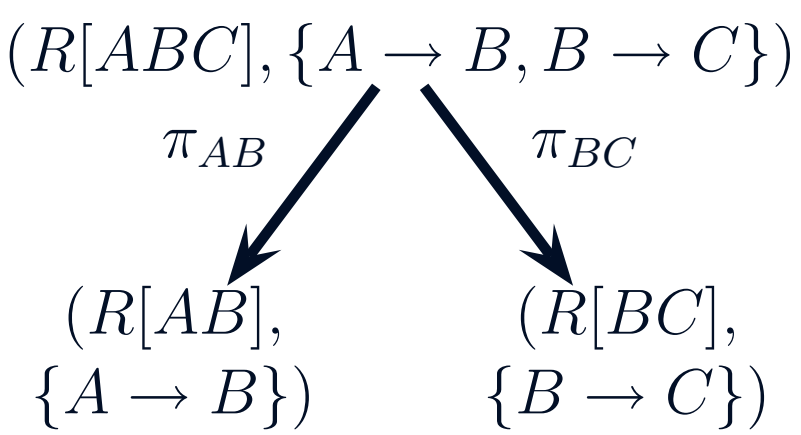

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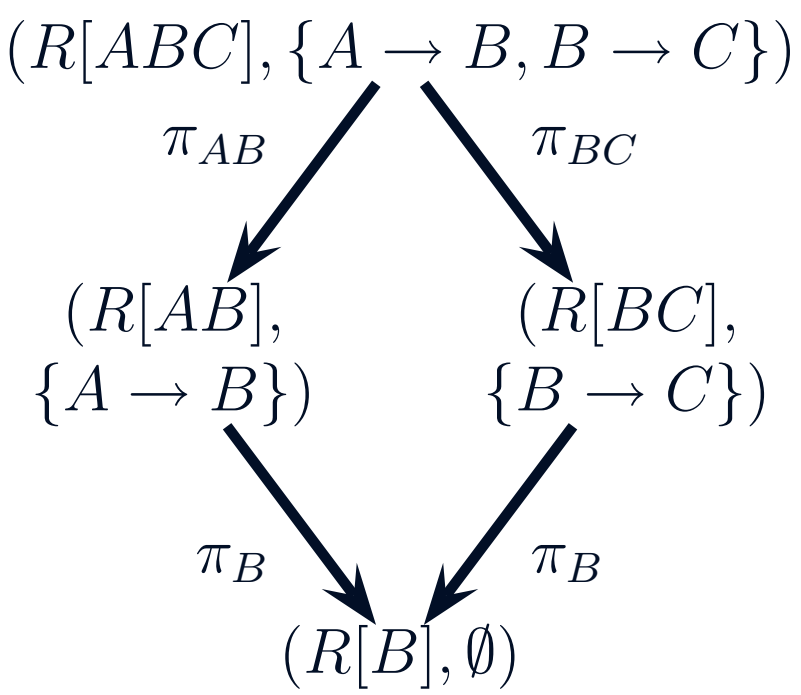

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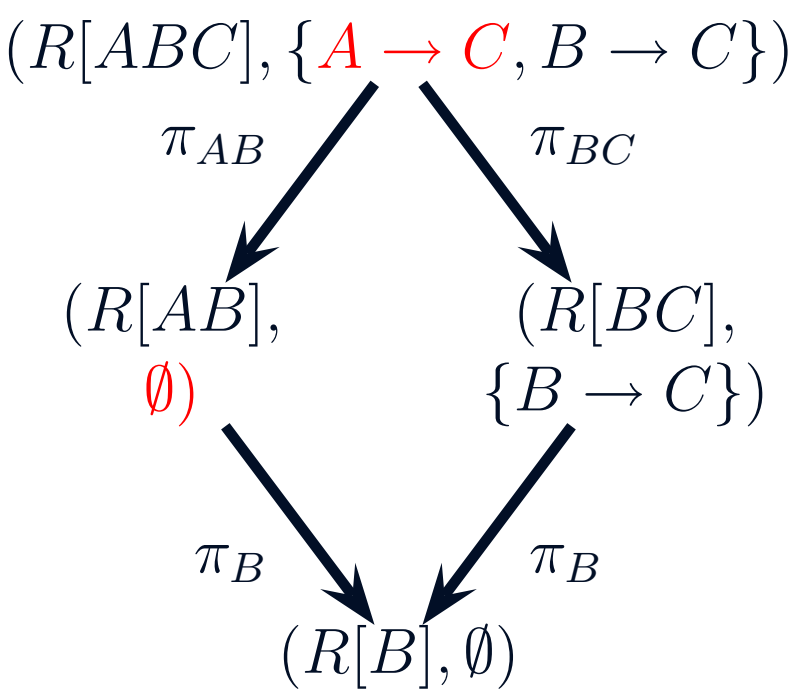

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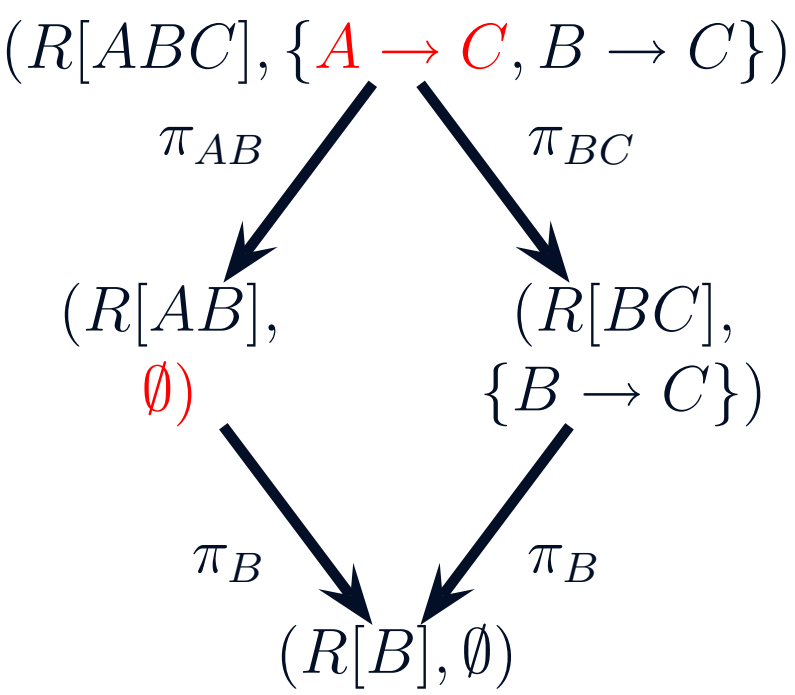

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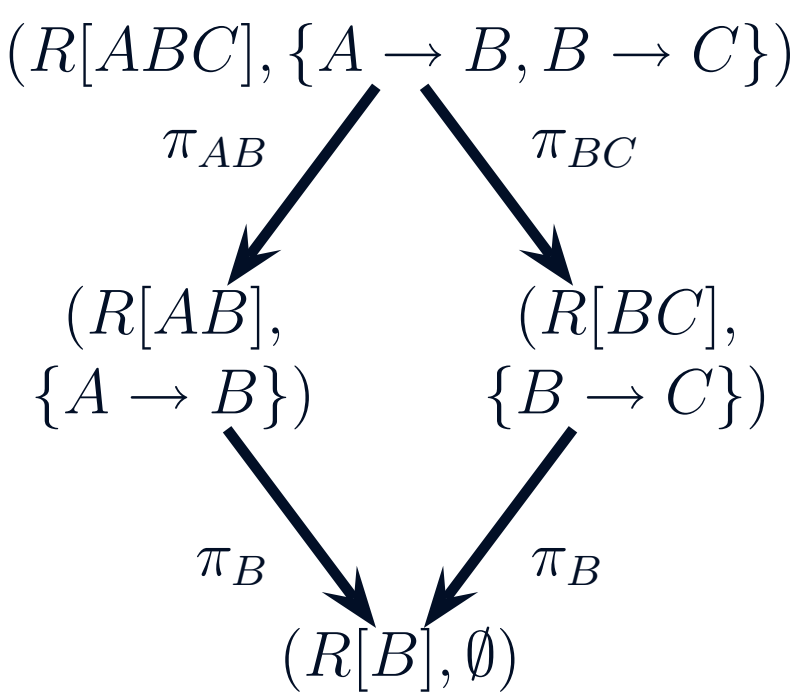

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- Goal: Use these ideas to motivate the definition of a component.

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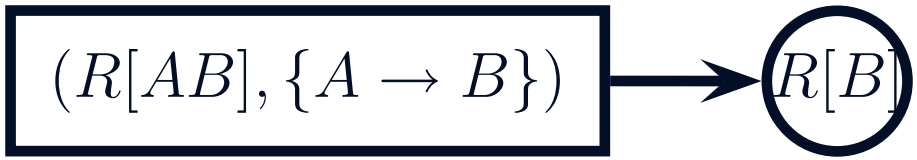

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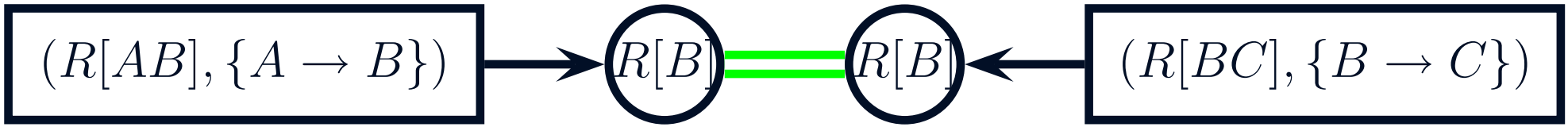

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- This recaptures lossless and dependency-preserving decomposition, but as a *composition* rather than as a decomposition.
- No reference to the main schema is necessary.

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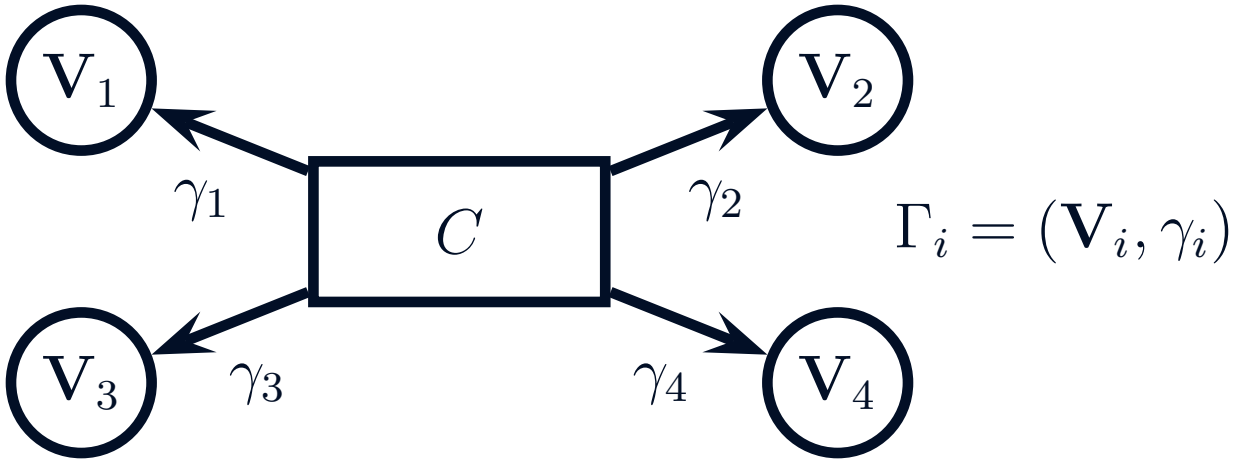

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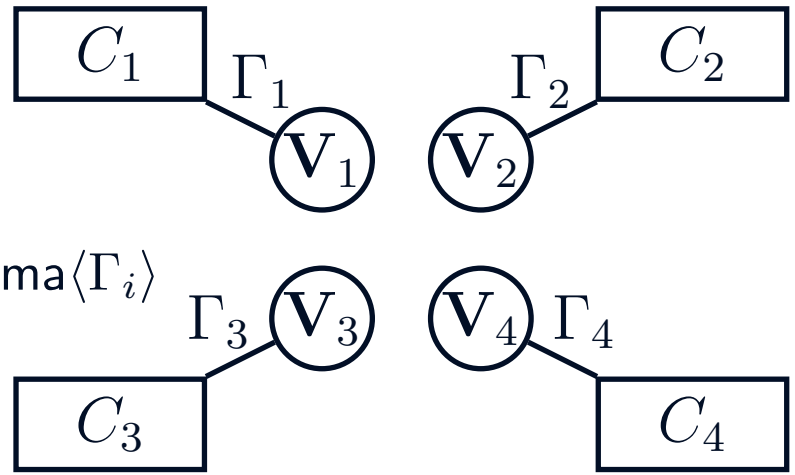

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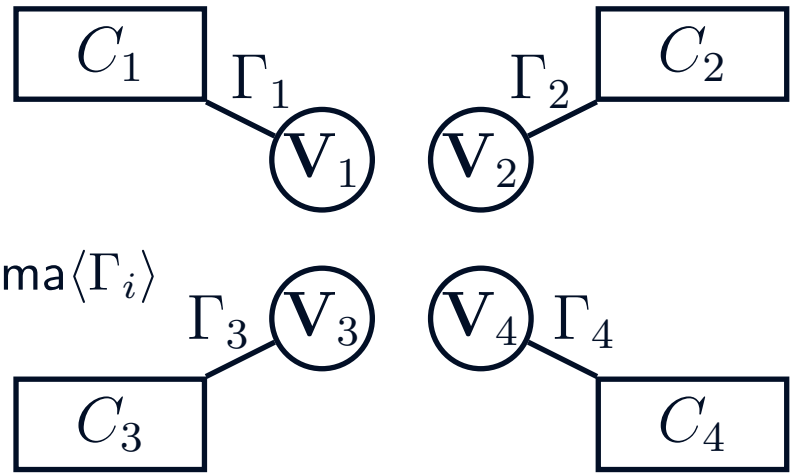

$\mathbf{V}_i \stackrel{\text{def}}{=} \mathsf{Schema}\langle \Gamma_i \rangle$

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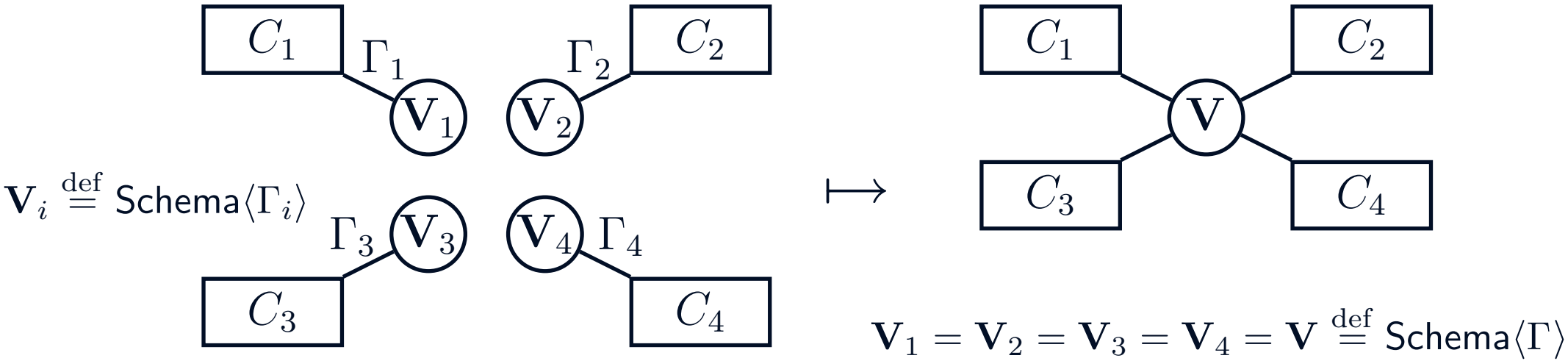

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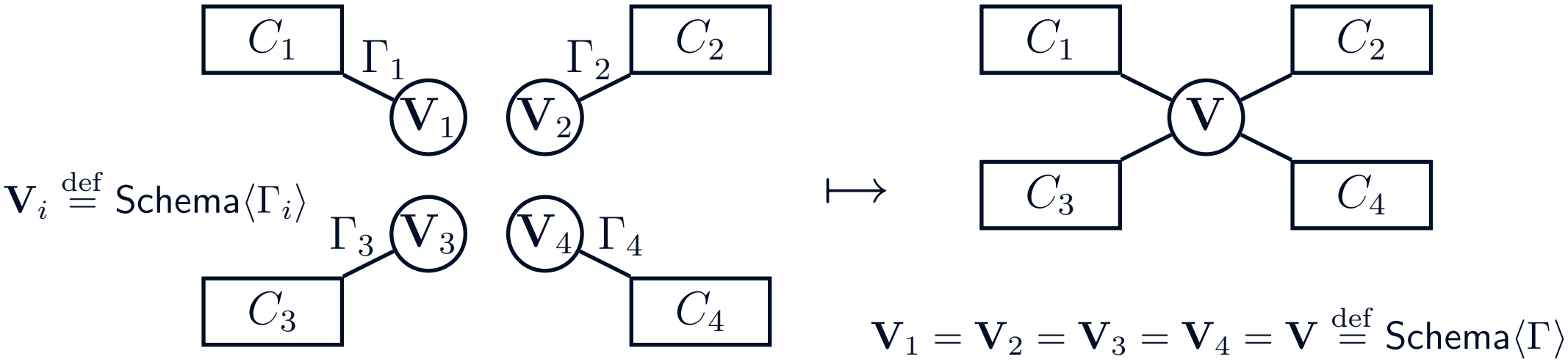

- An *interconnection family* is a set of star interconnections.

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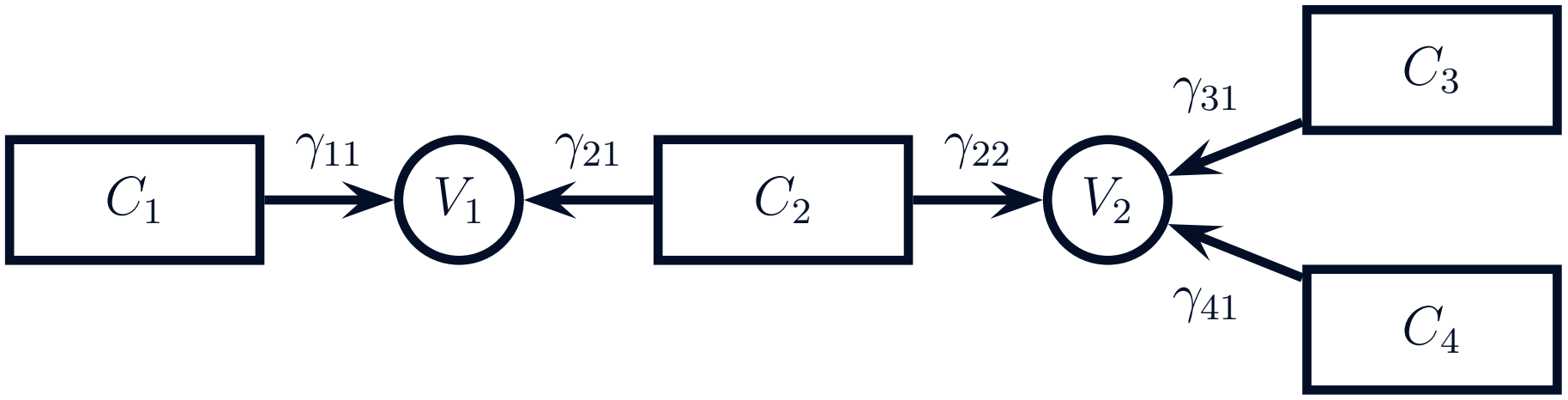

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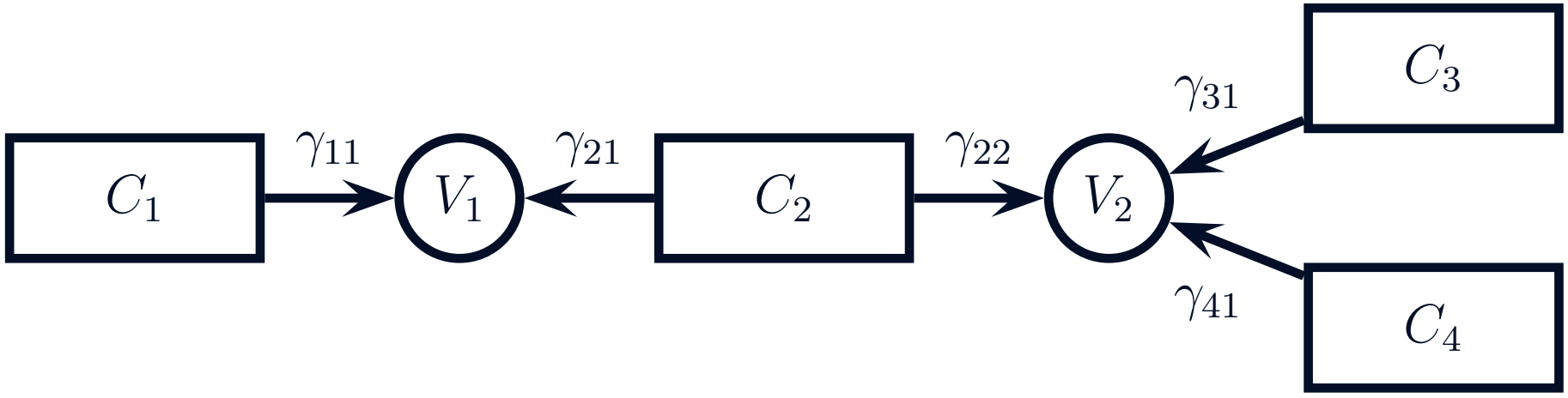

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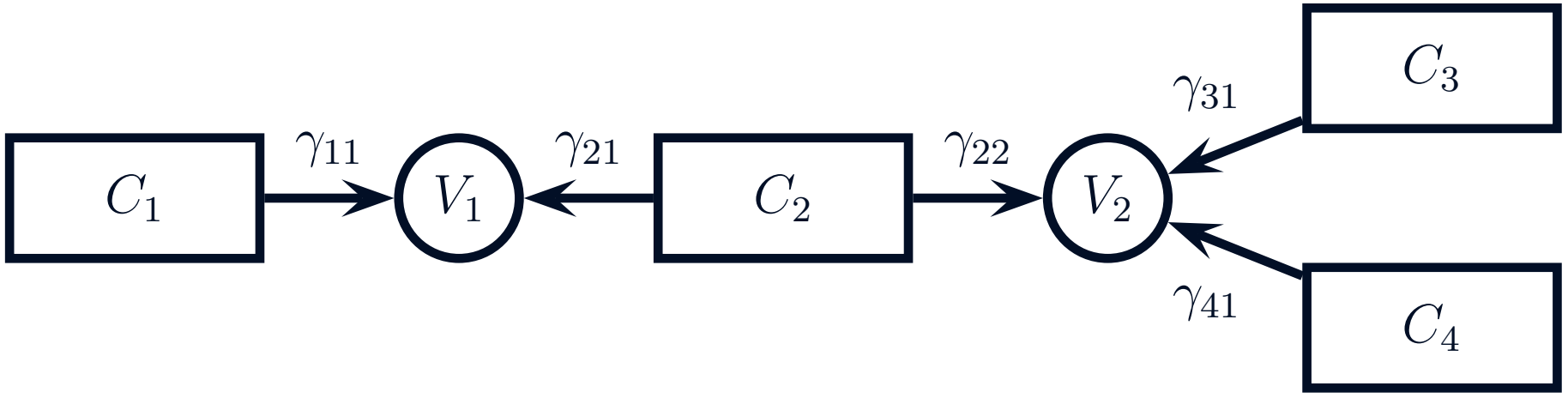
- Unfortunately, serious complications arise if the interconnection is allowed to be cyclic.



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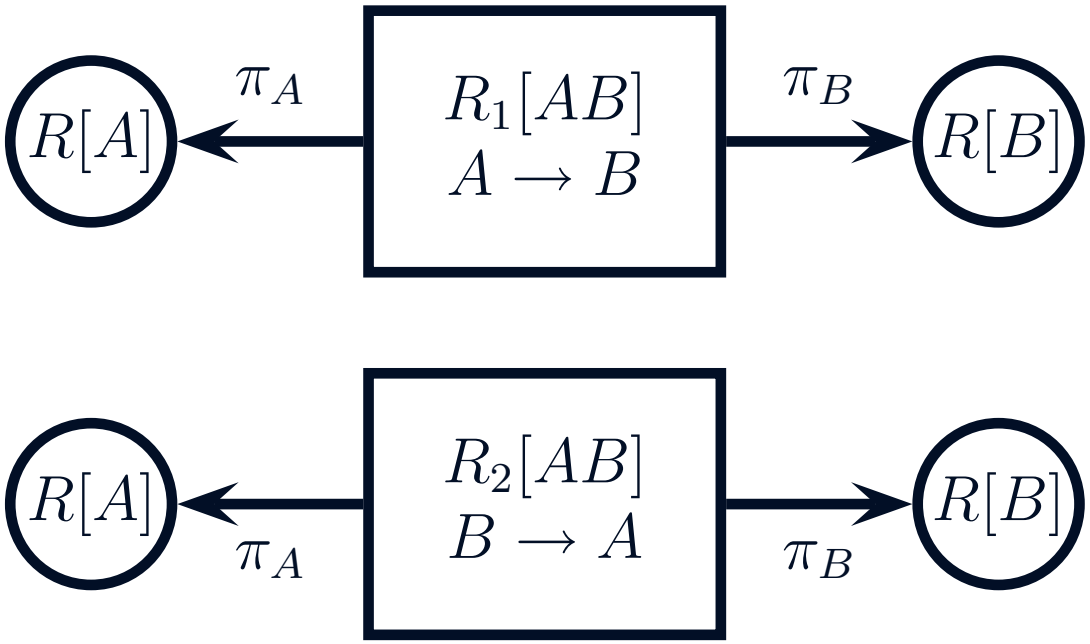

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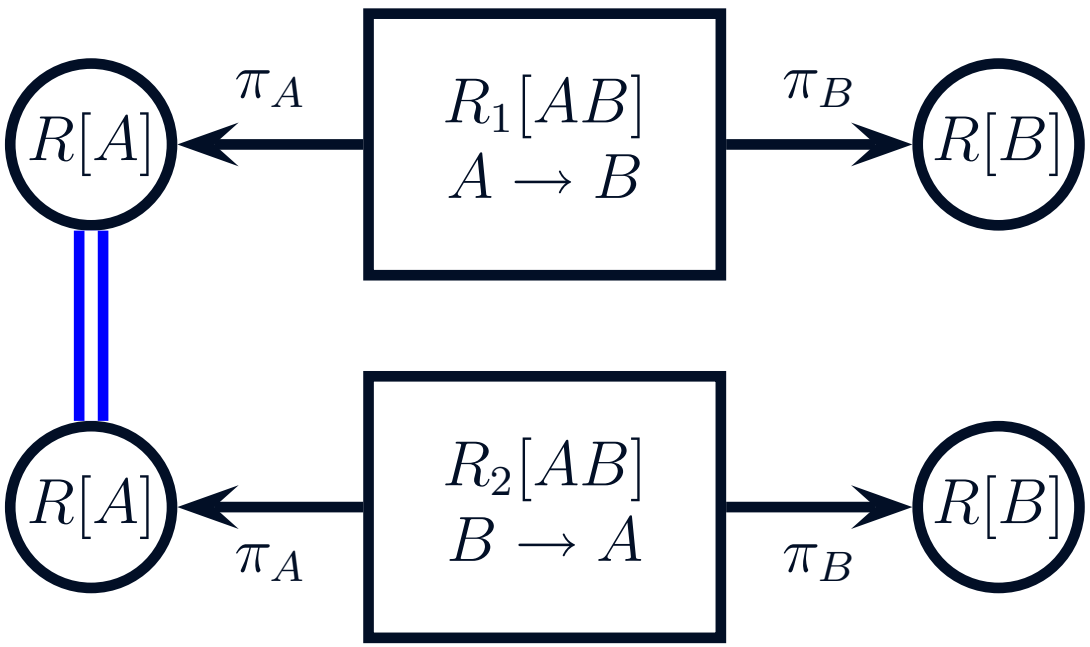

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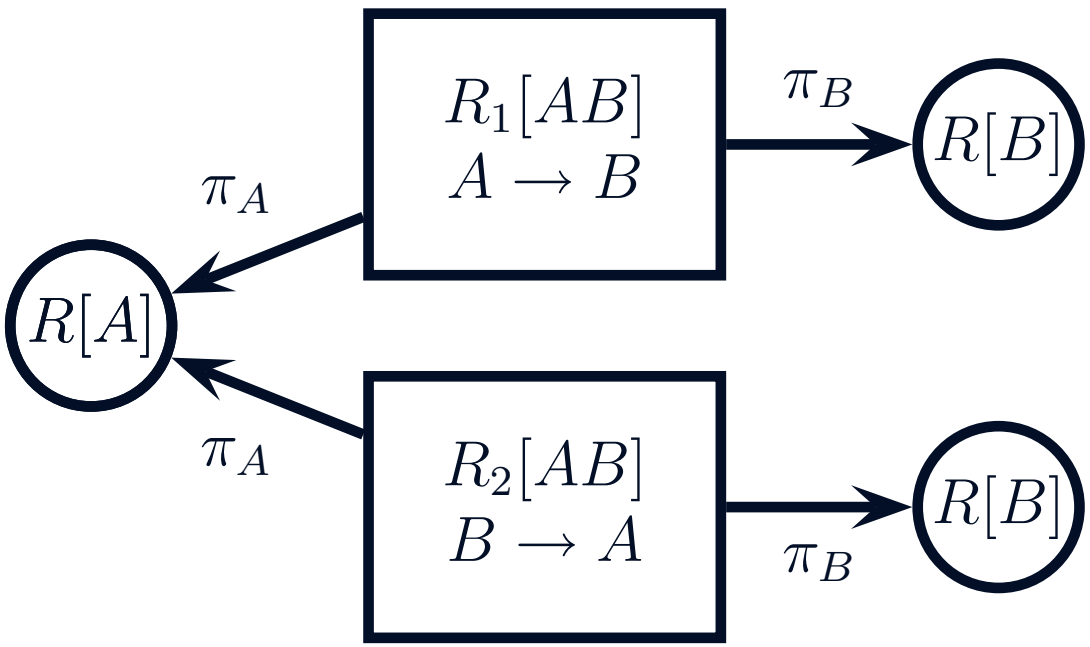

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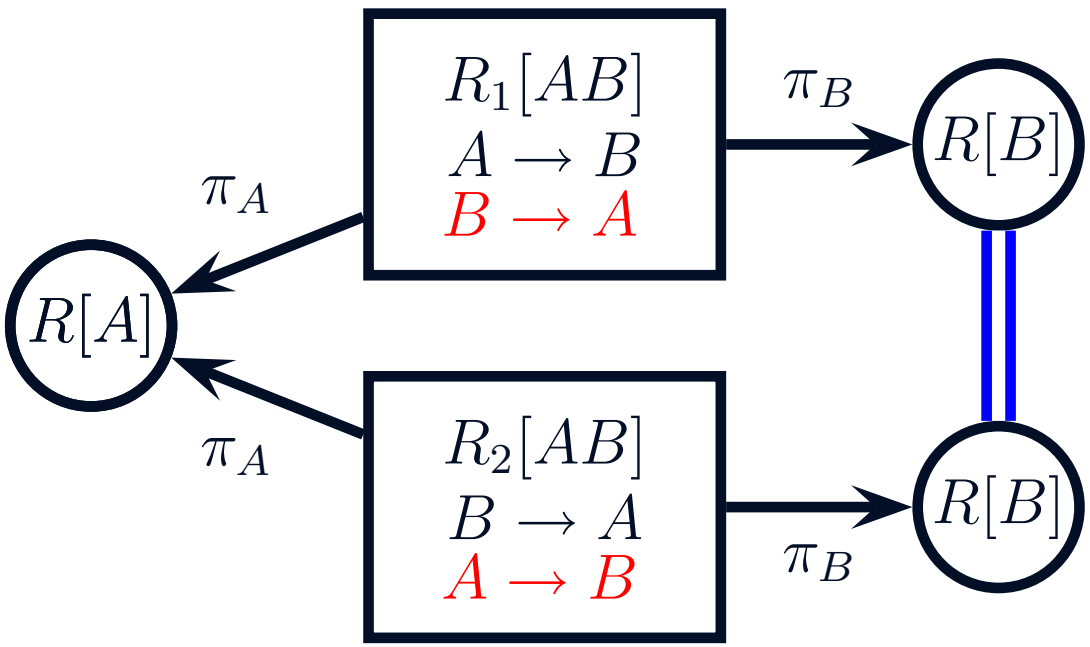

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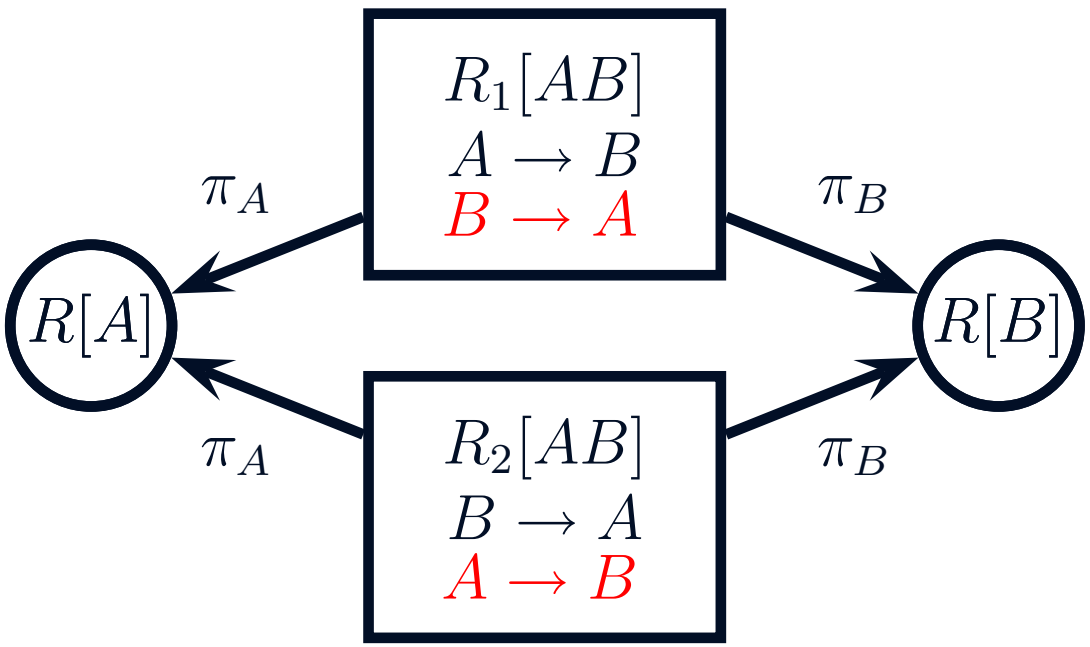

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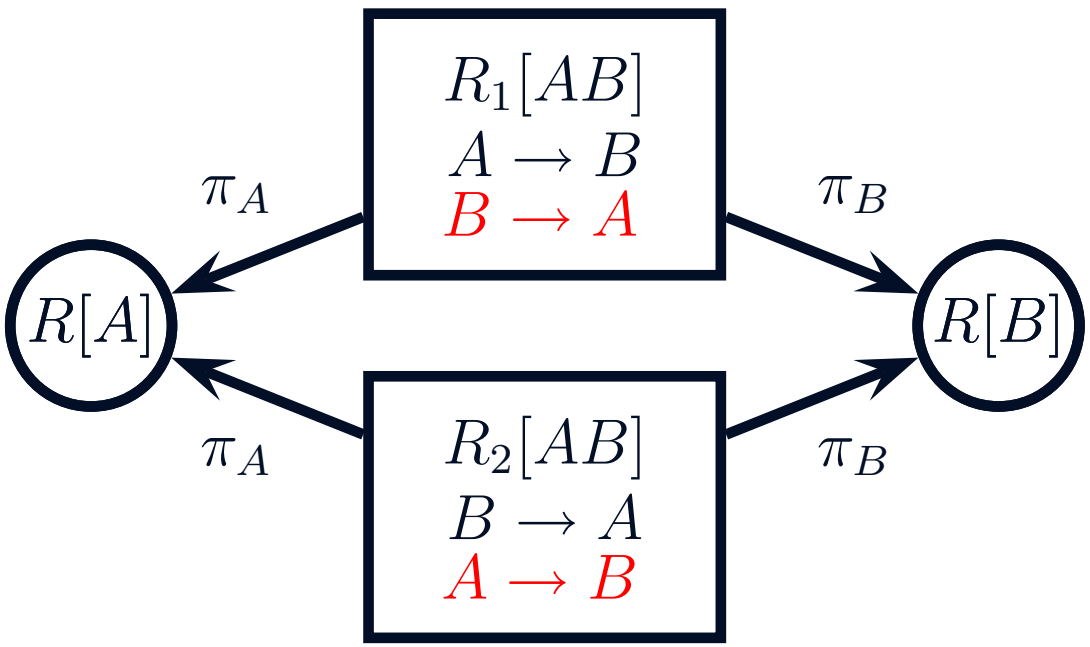

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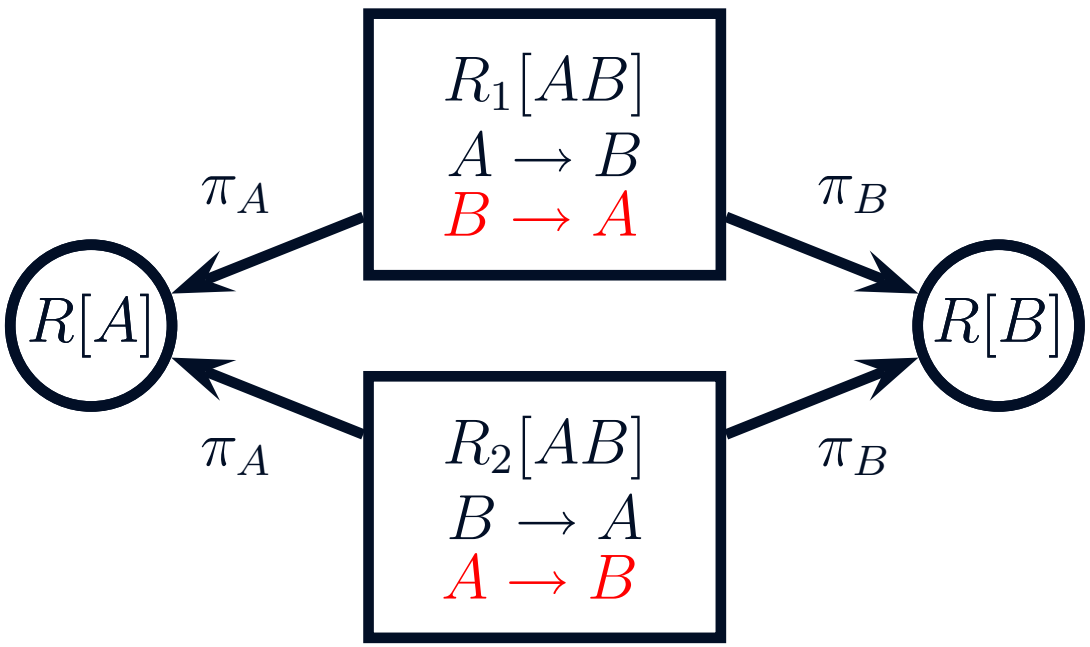

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- This type of cyclic interconnection is manageable.

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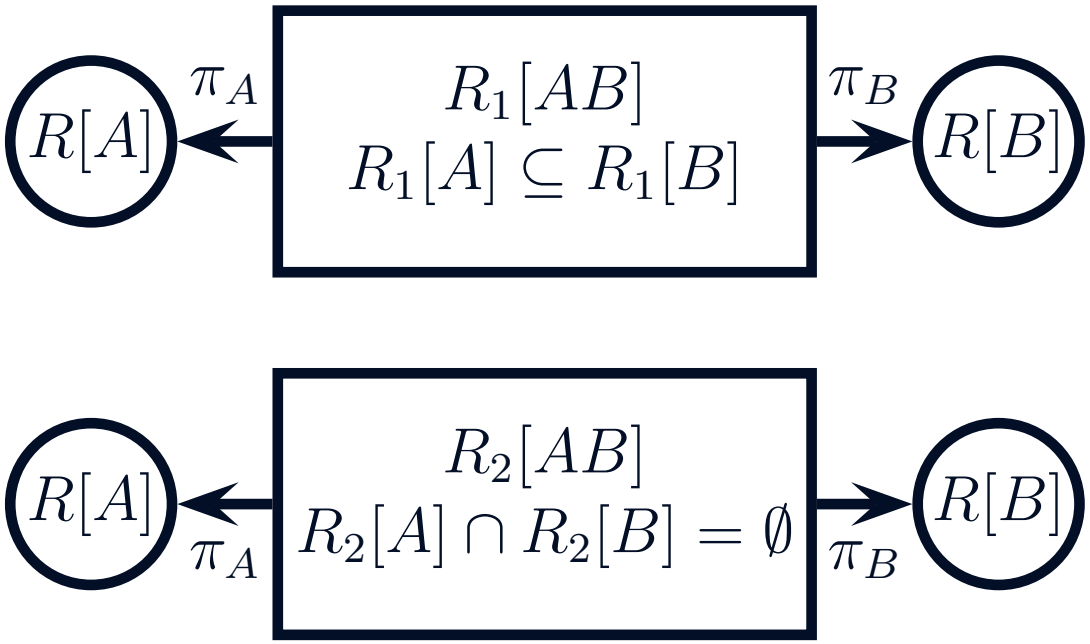

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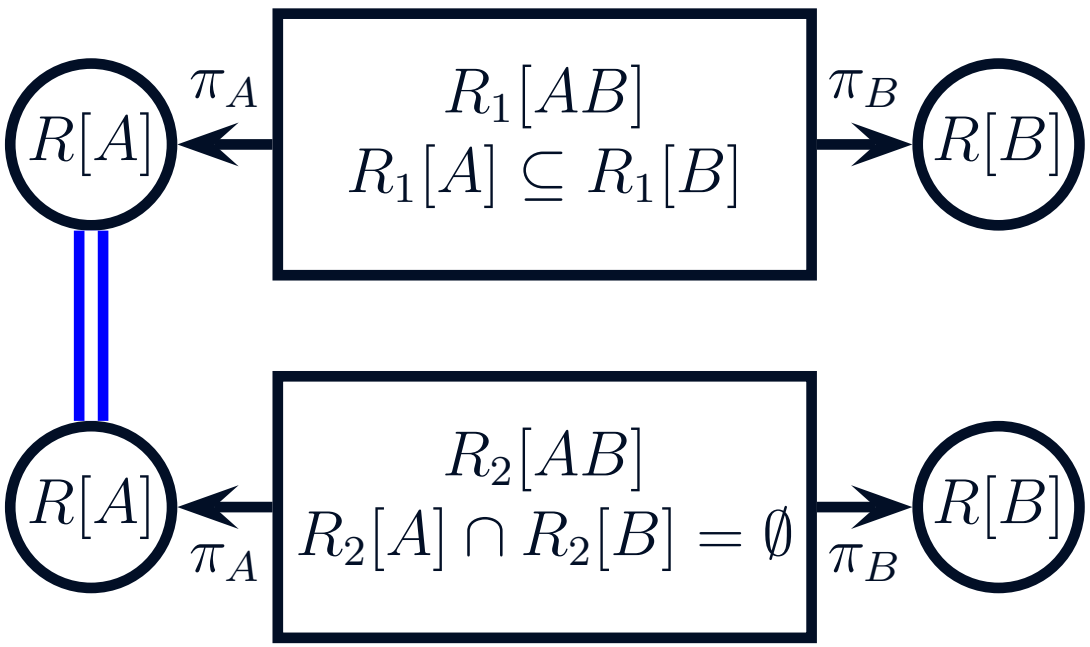

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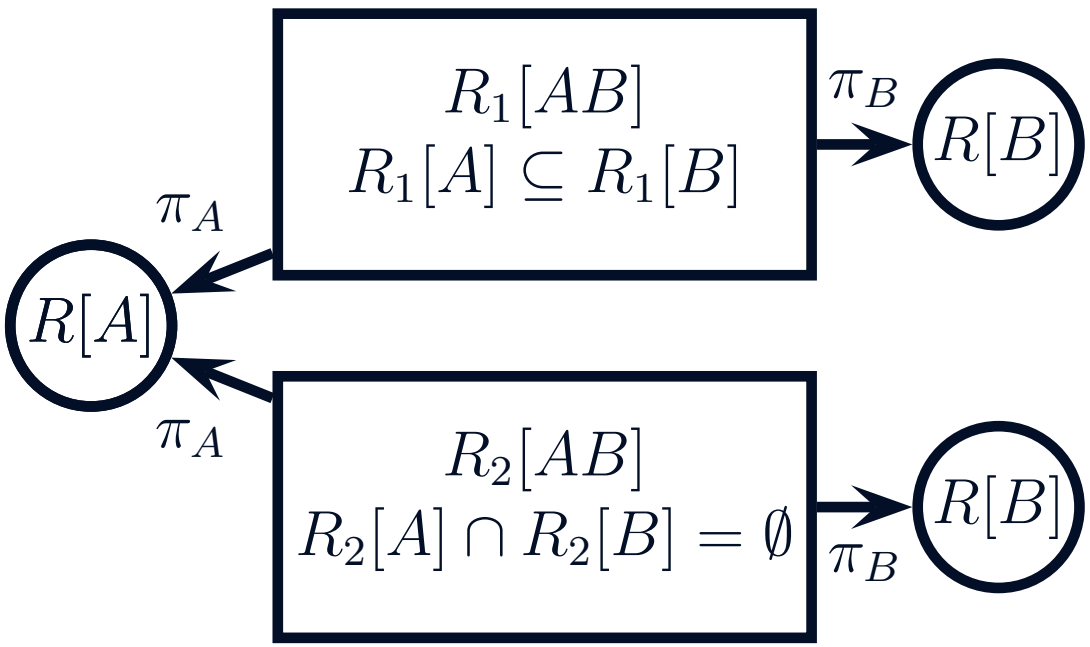

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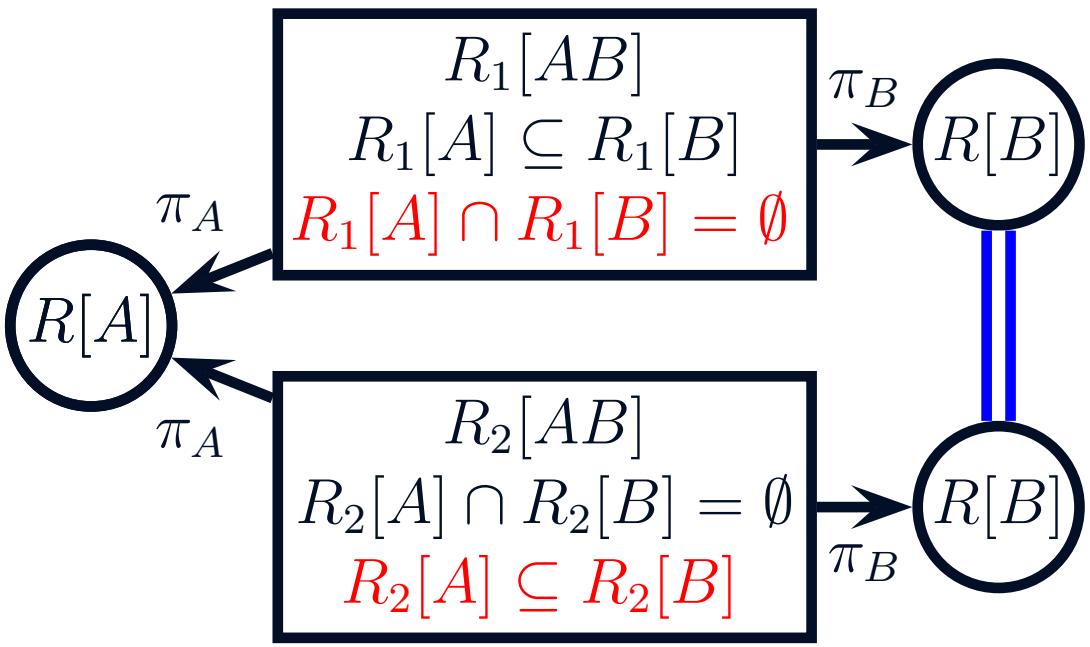

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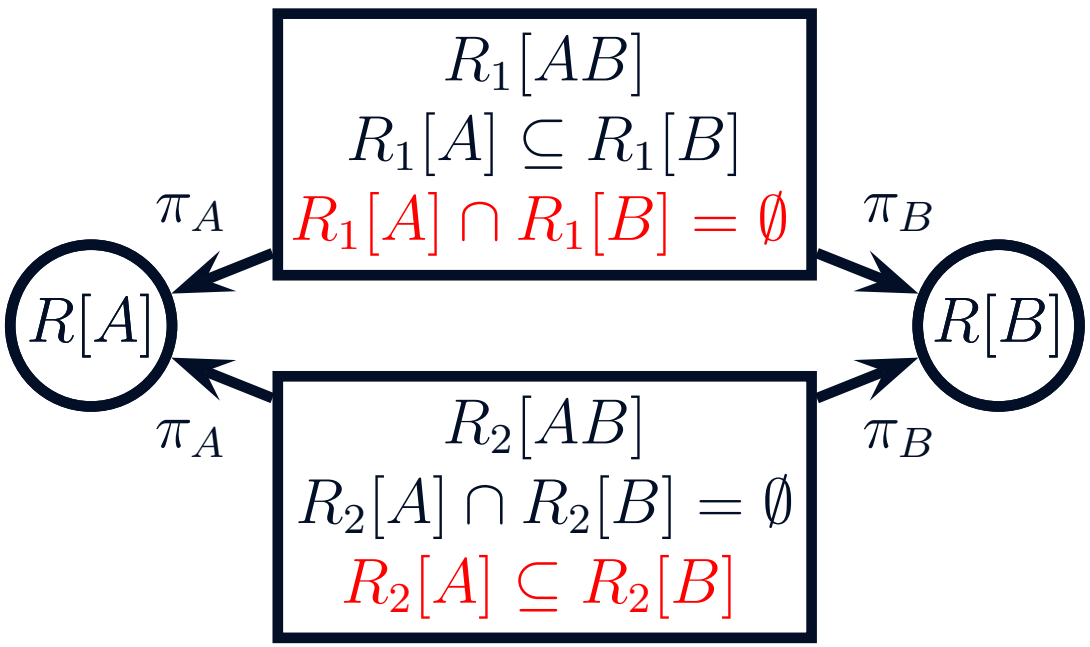

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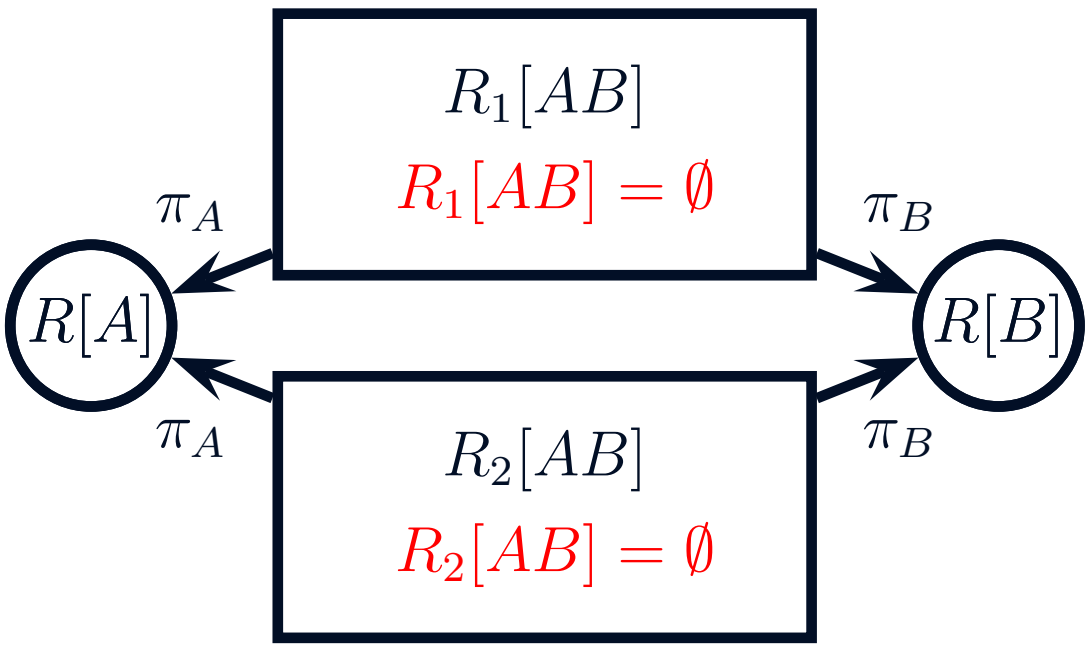

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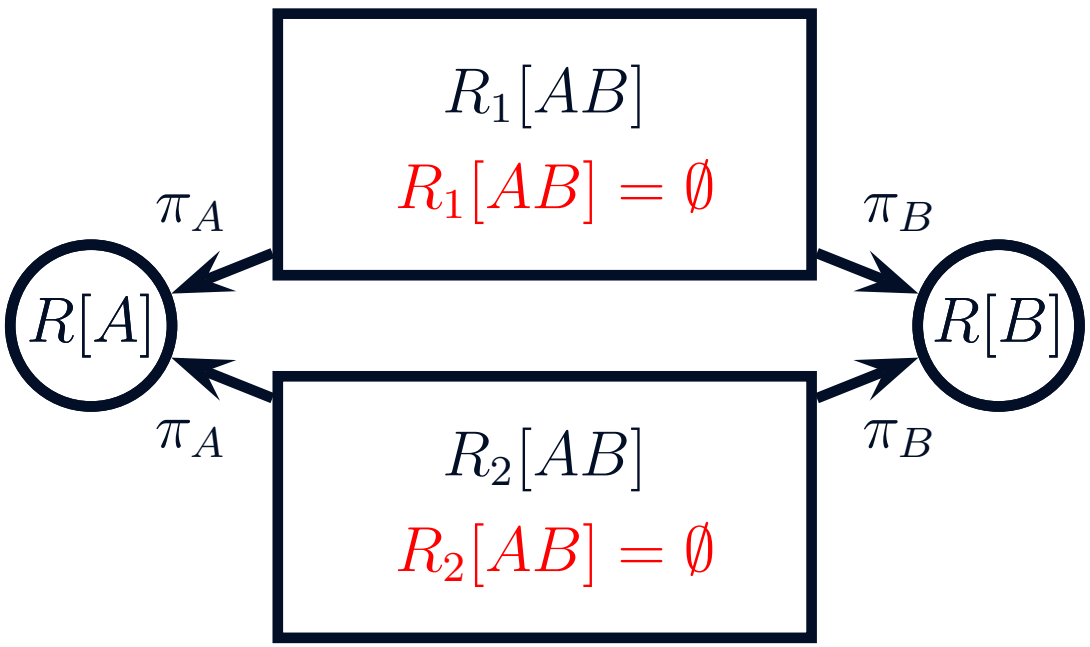

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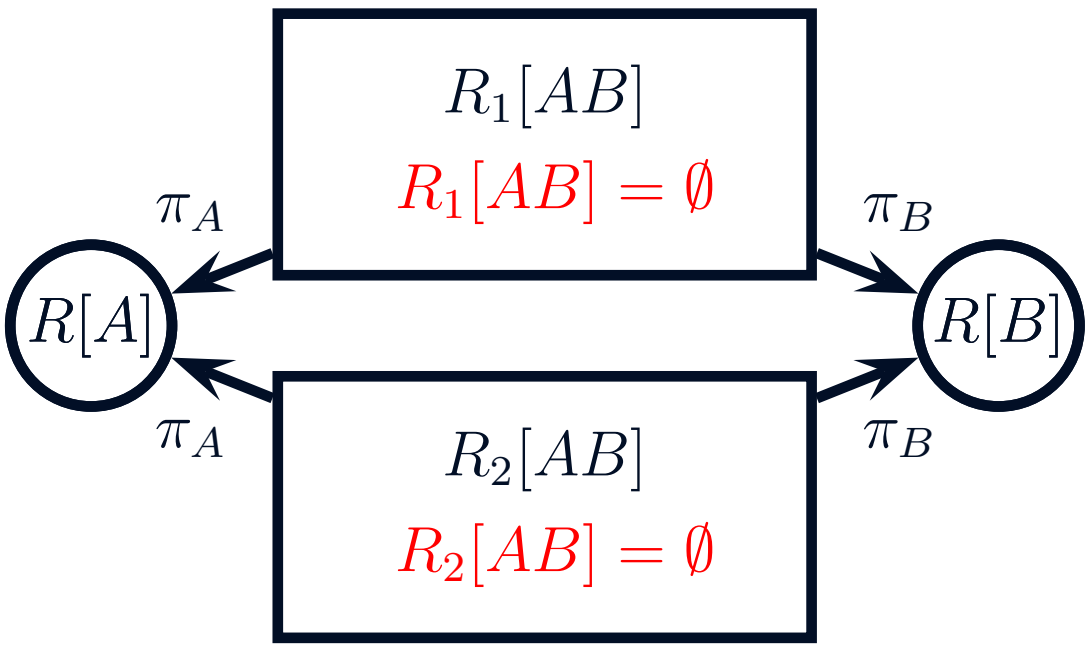

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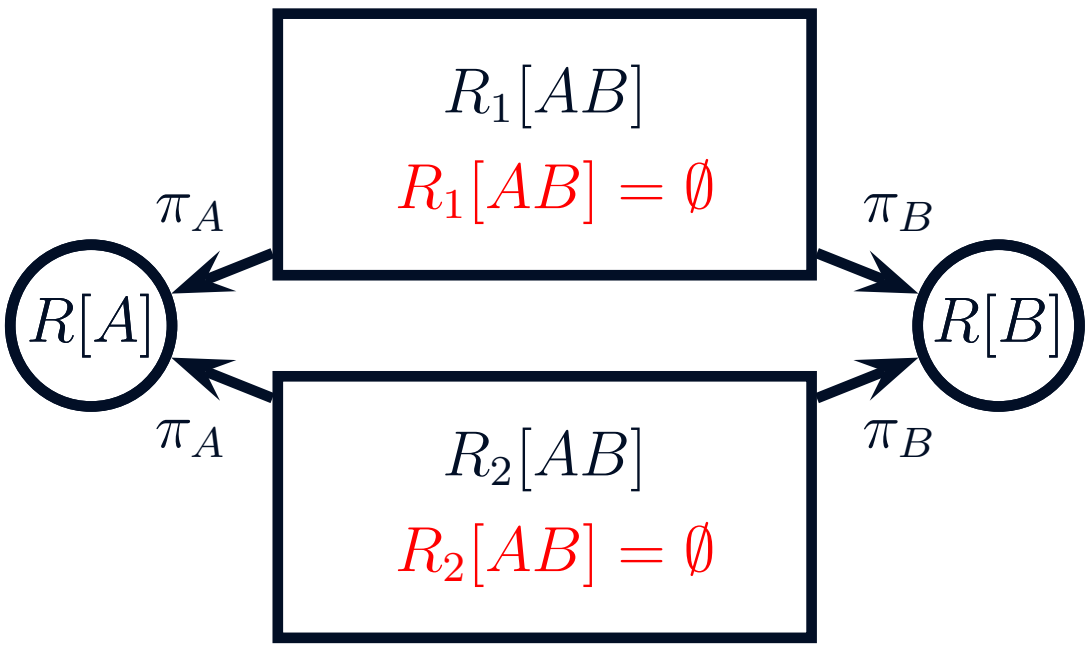

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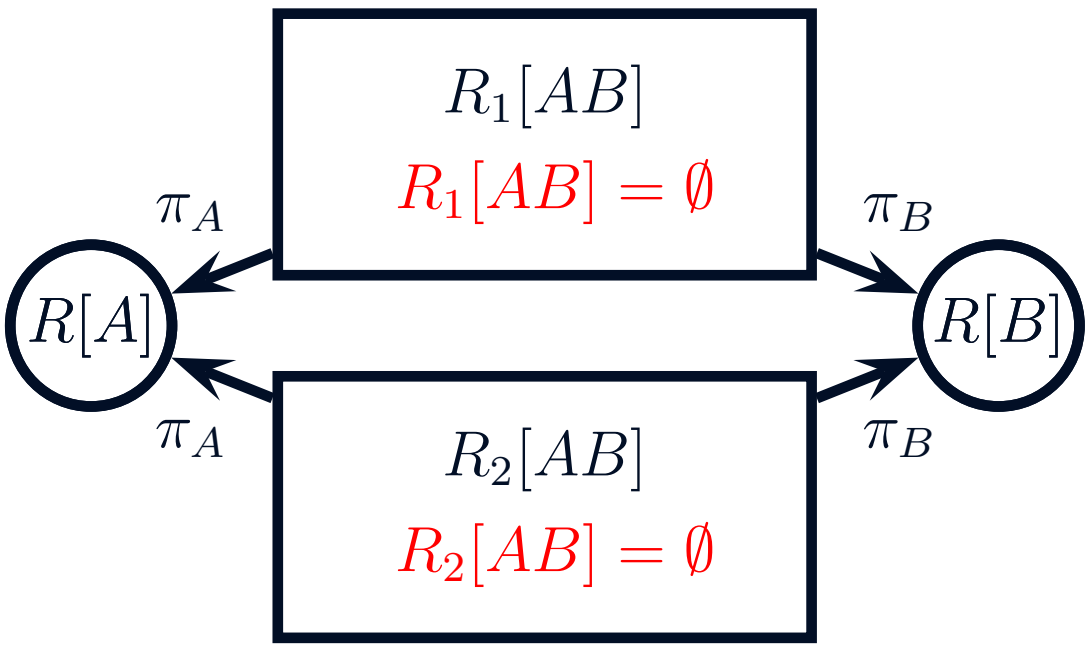

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$\Rightarrow$ Cyclicity is a major issue to be addressed in the theory.

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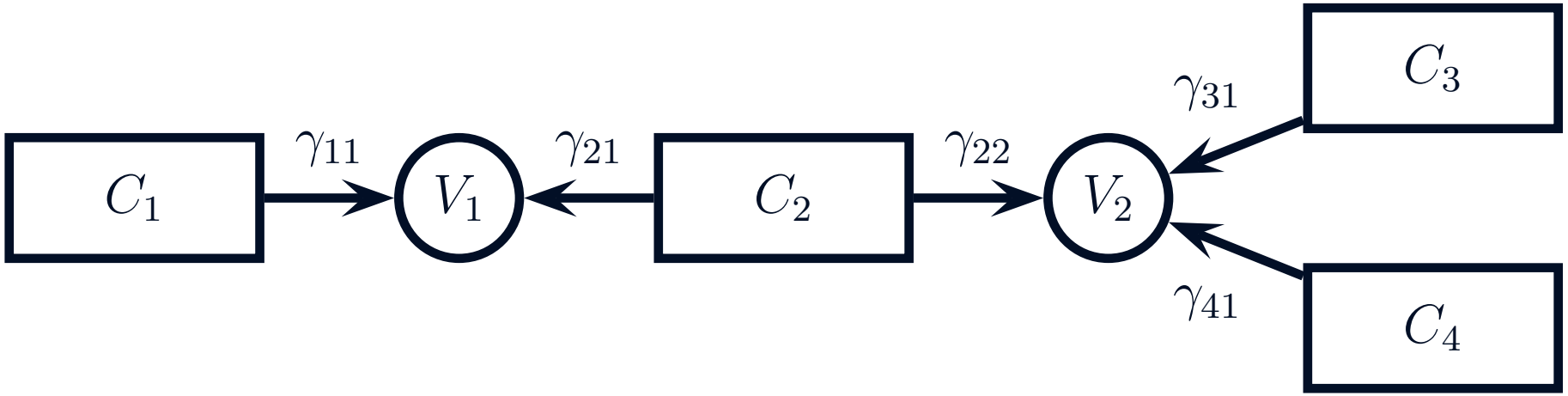

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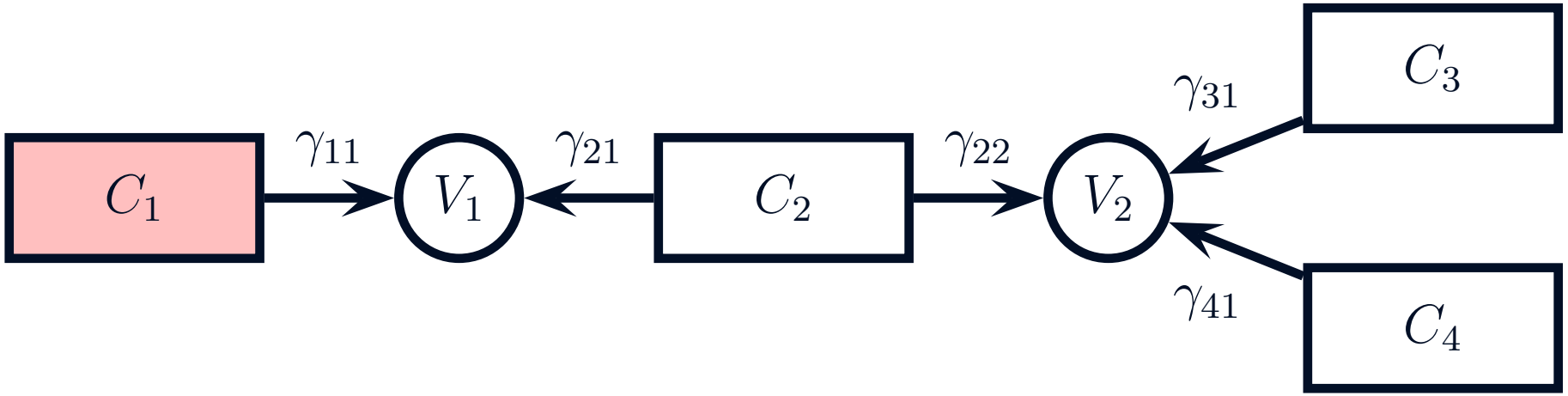

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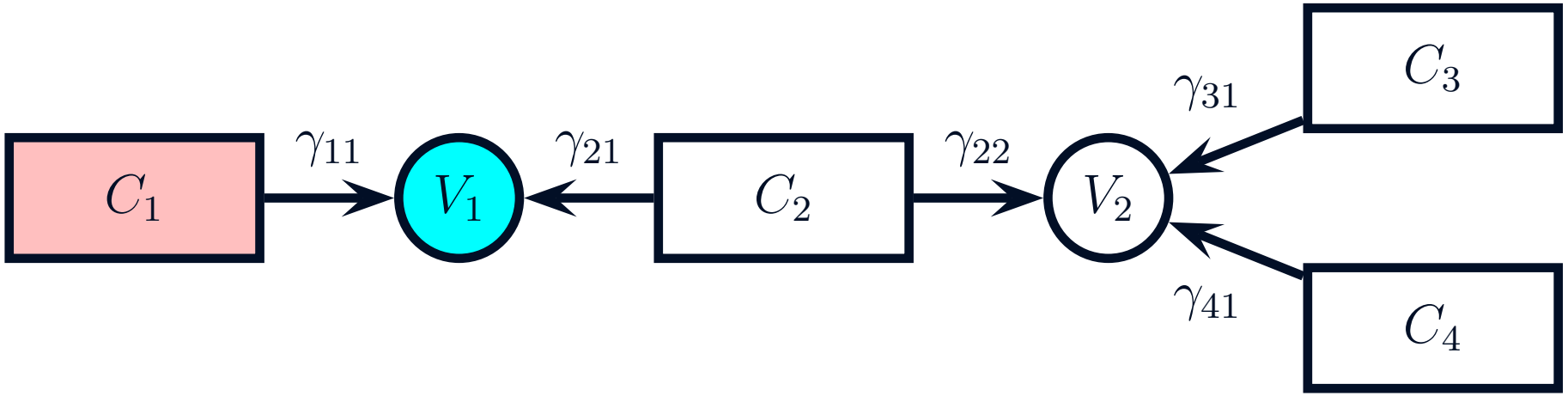

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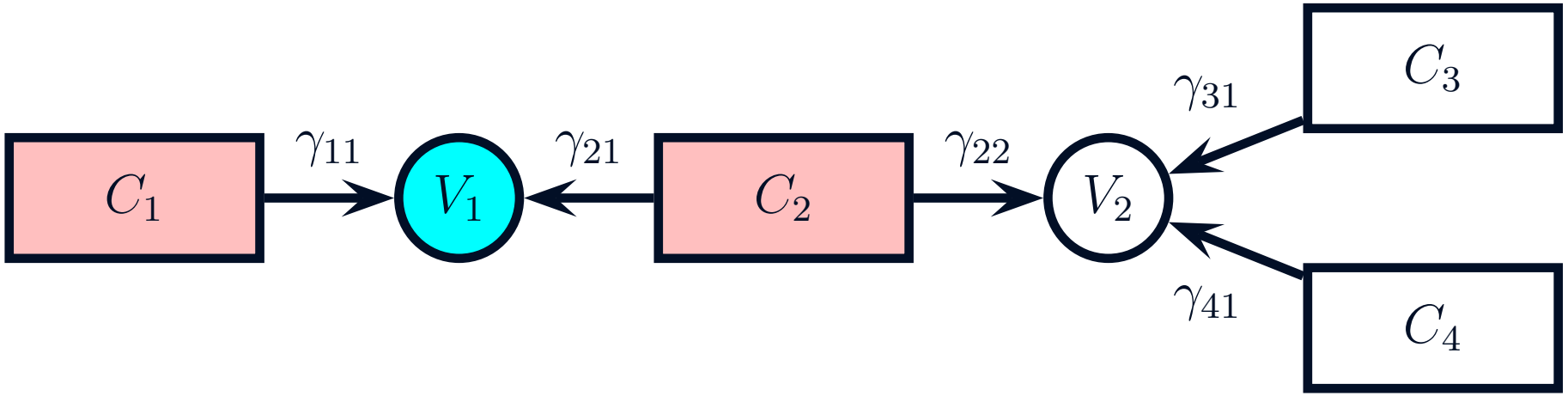

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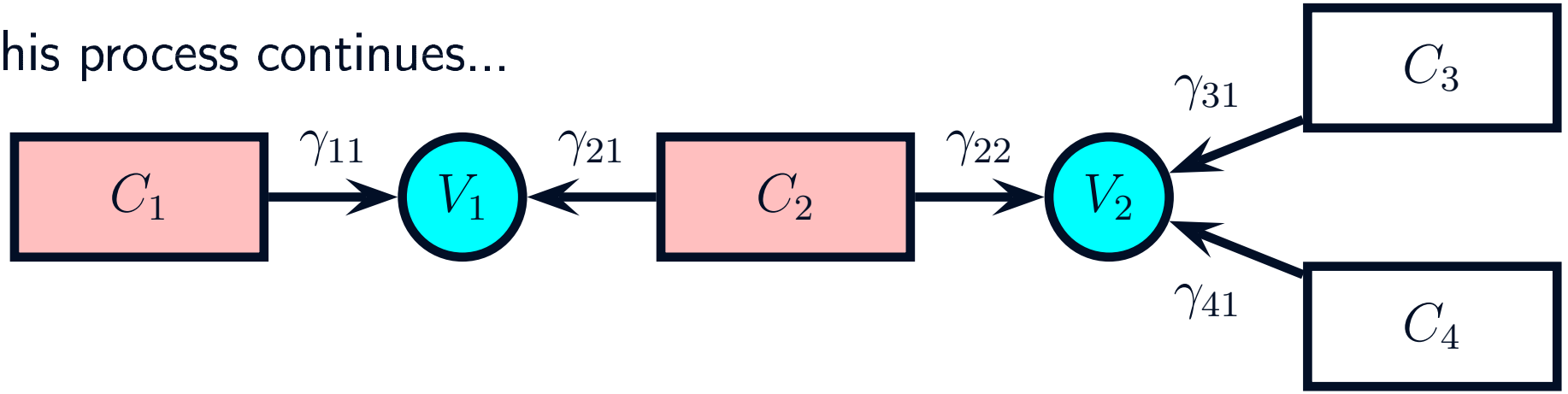

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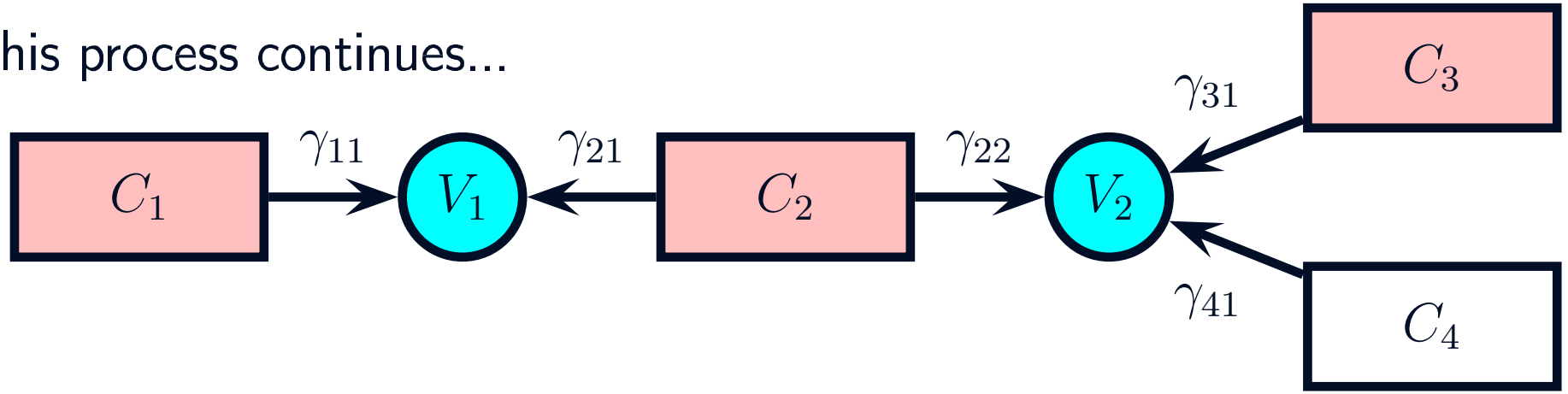

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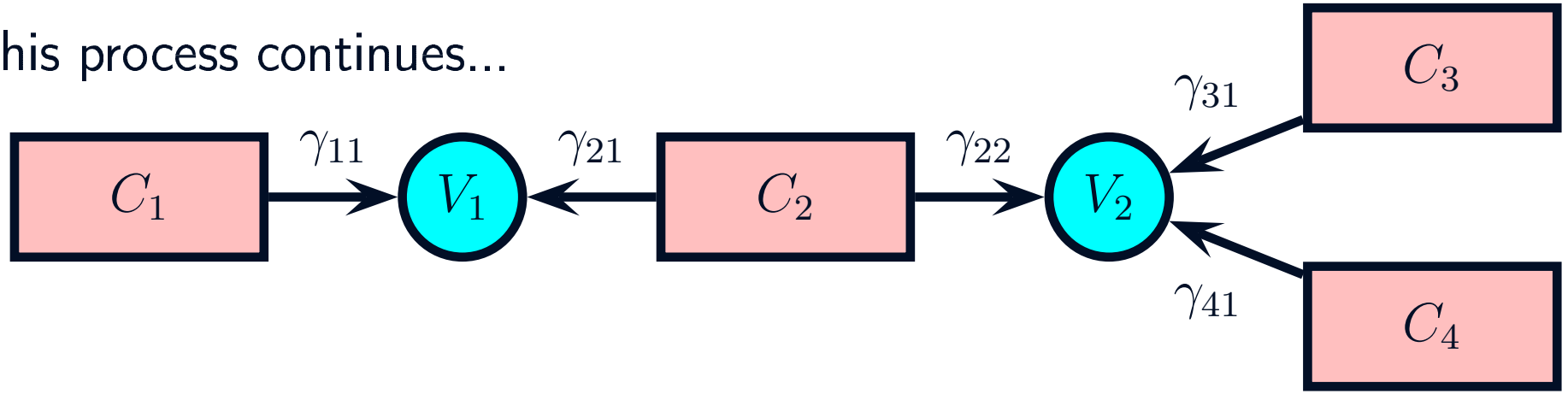

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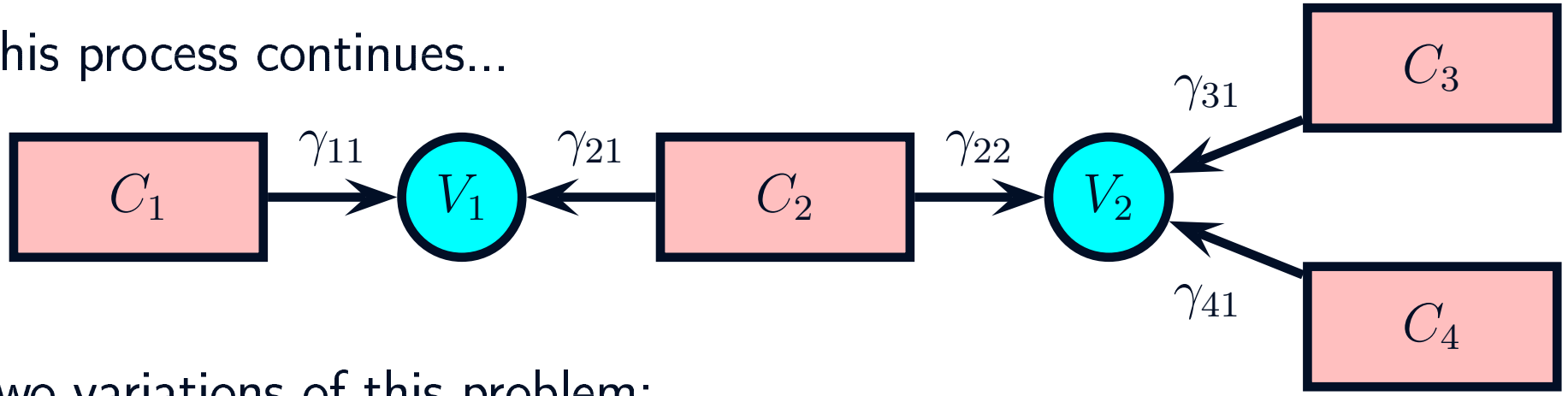

- Two variations of this problem:
  - *Cooperative update*: [Hegner and Schmidt: ADBIS 2007]
  - *Canonical update*: [Hegner: FoIKS 2008 (probably)]

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