How to Complete an Interactive Configuration Process?

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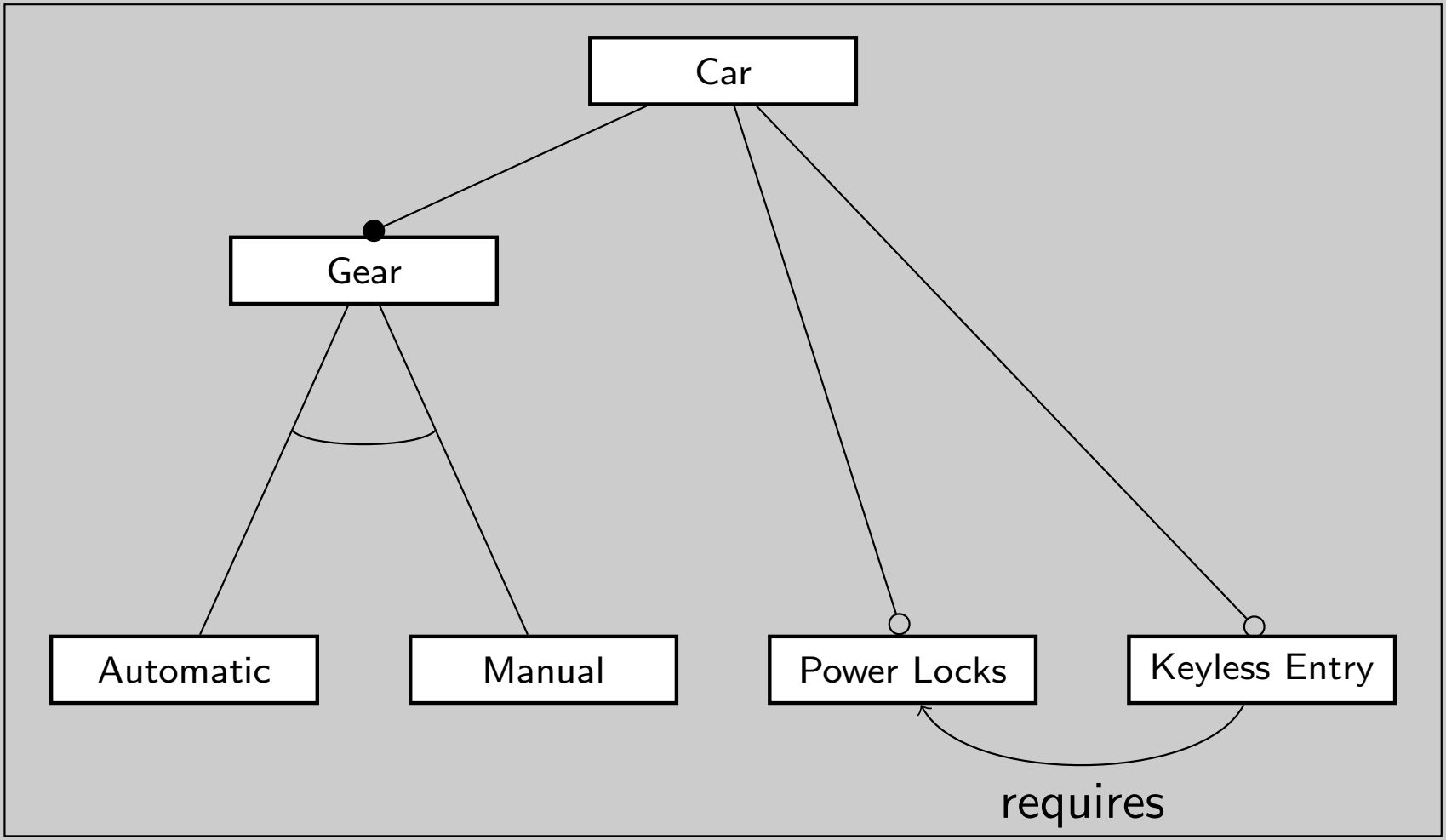
Feature Diagrams



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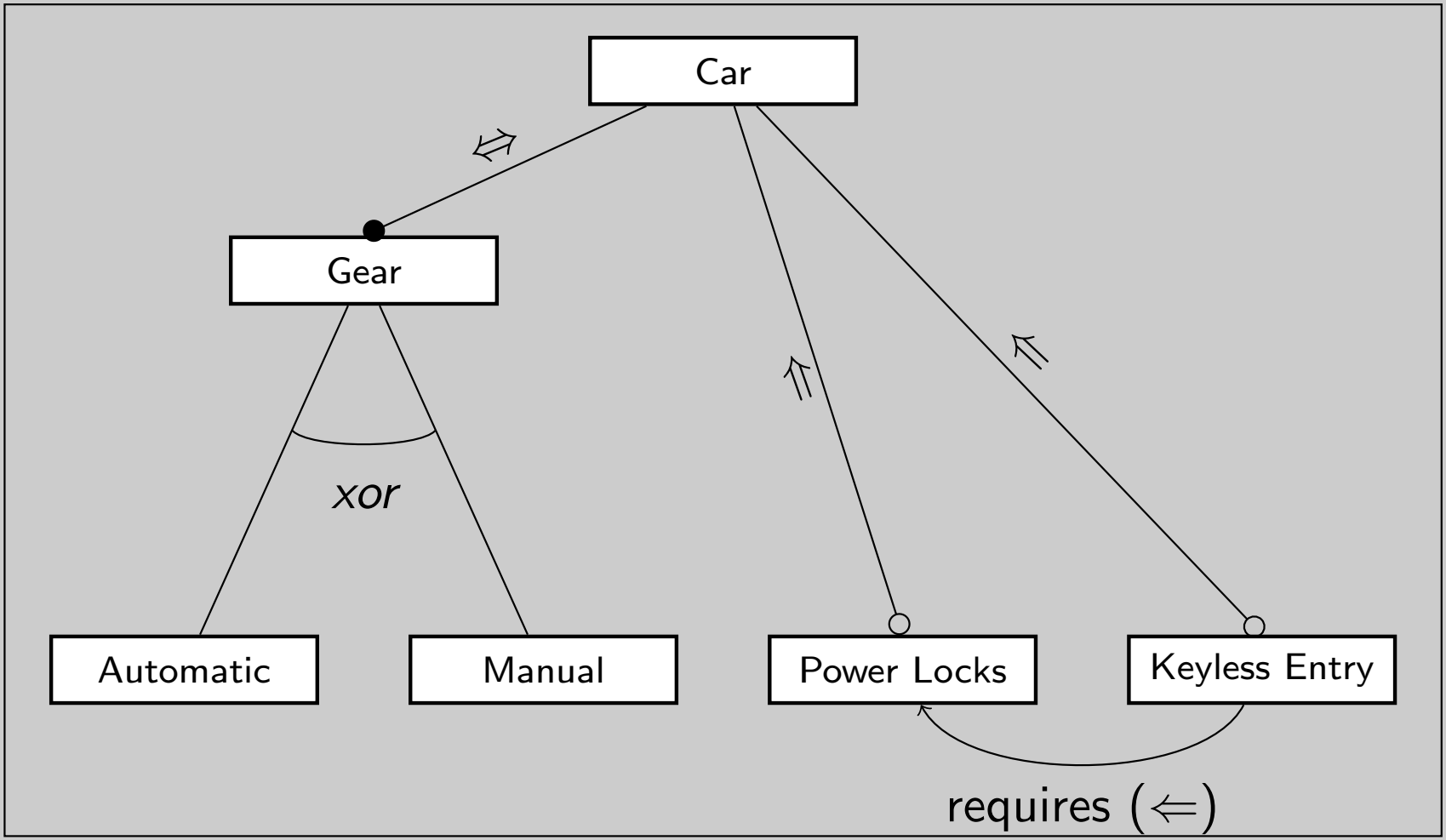

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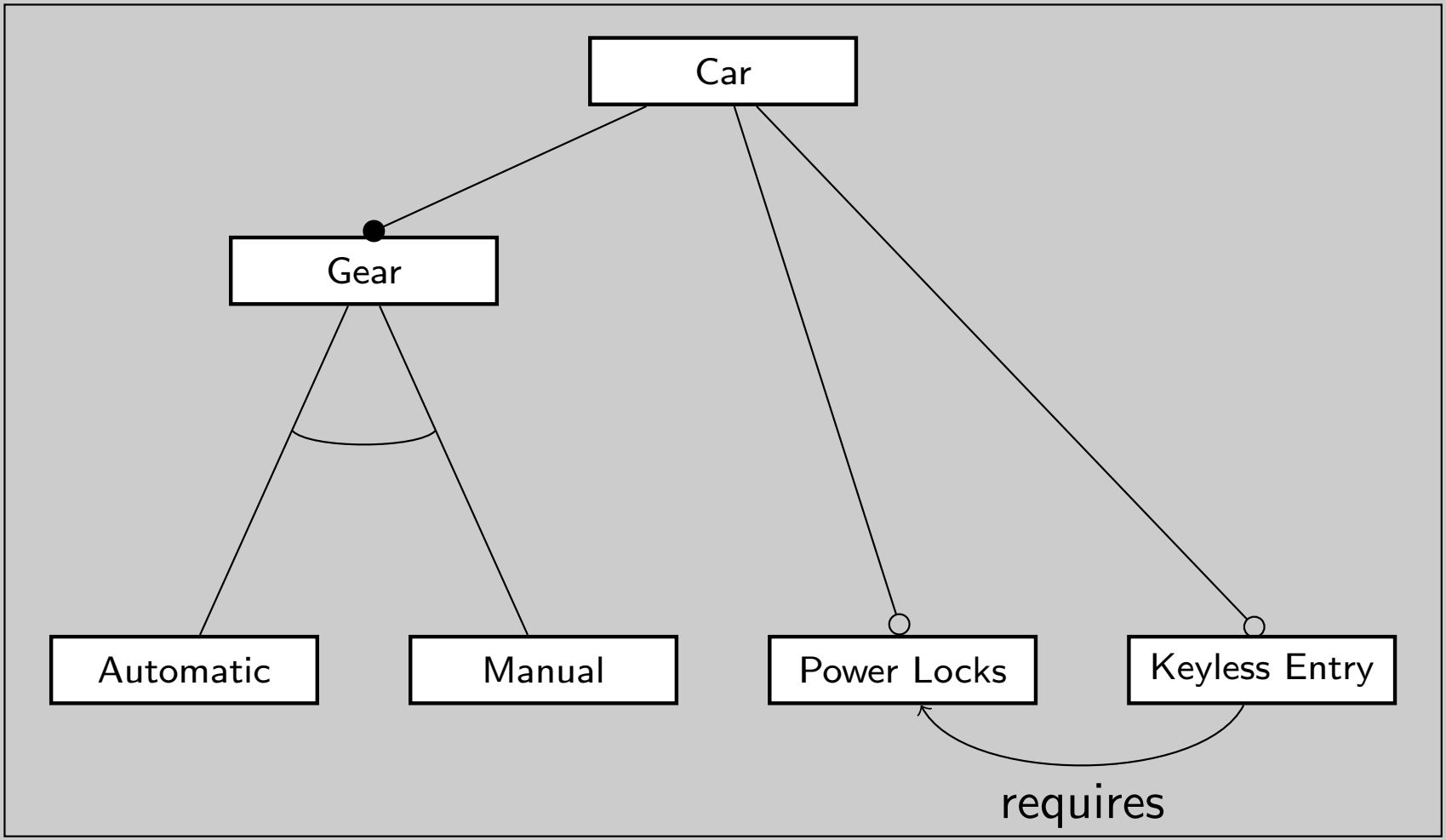

Legend

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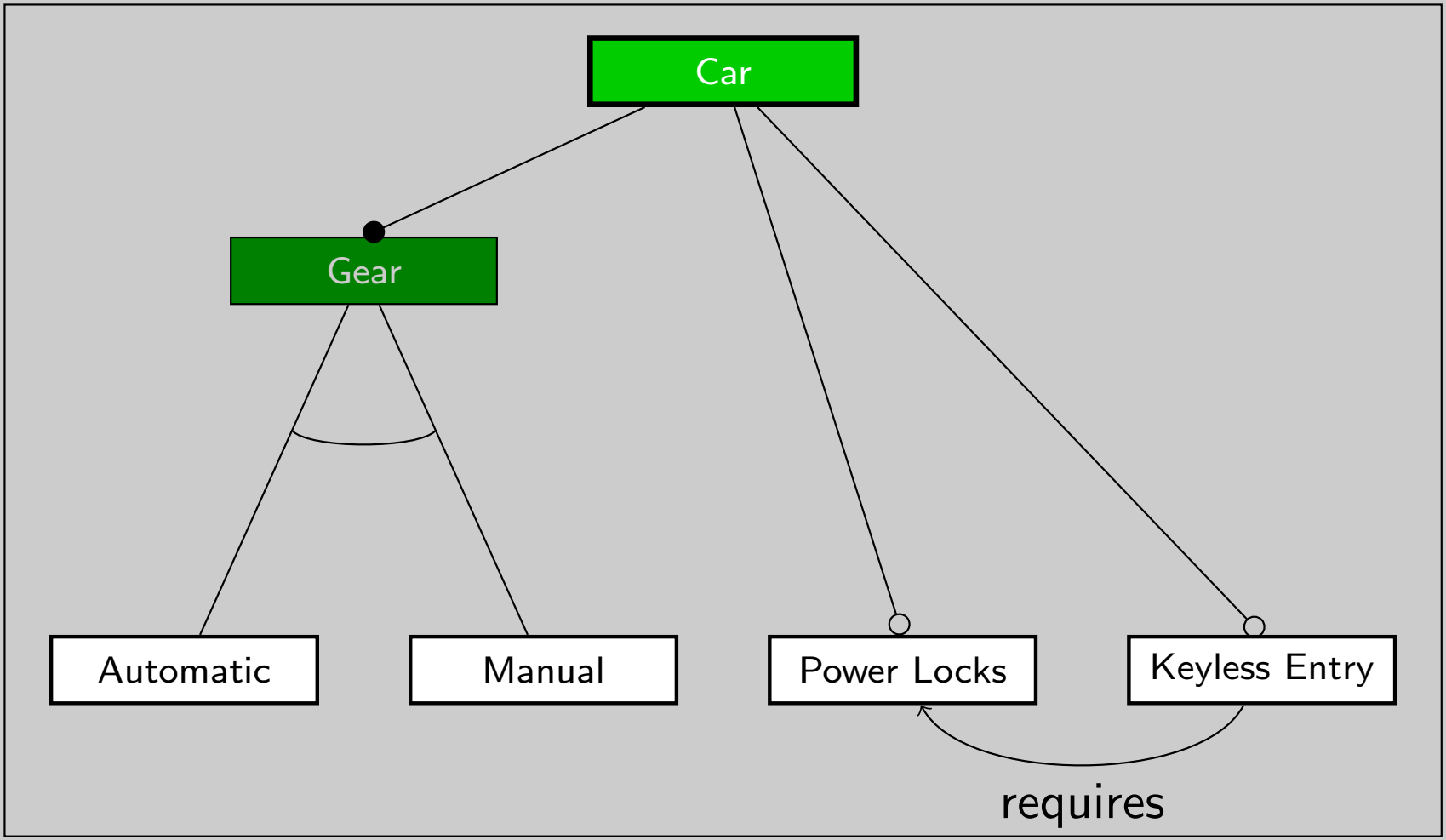

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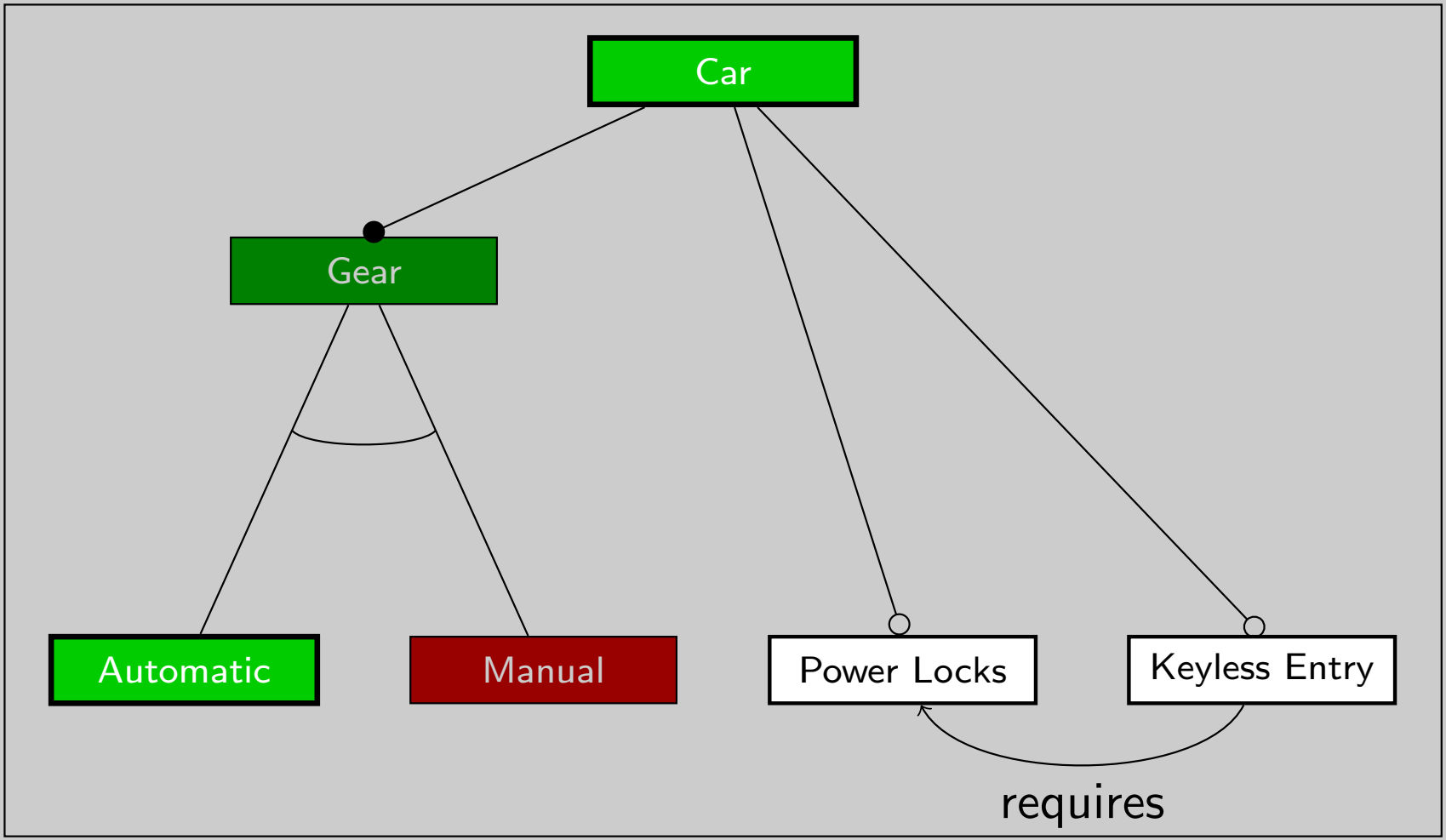

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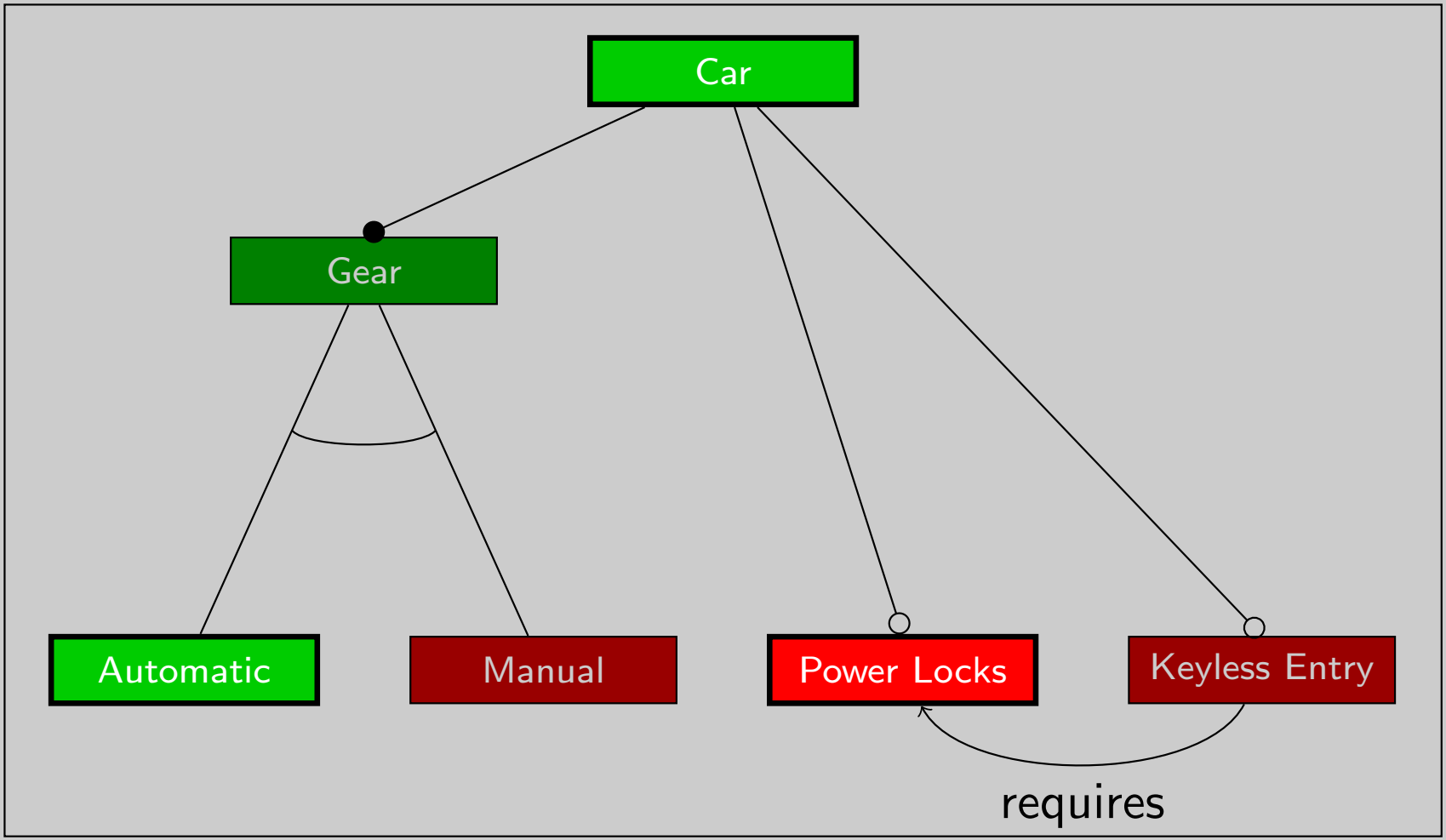

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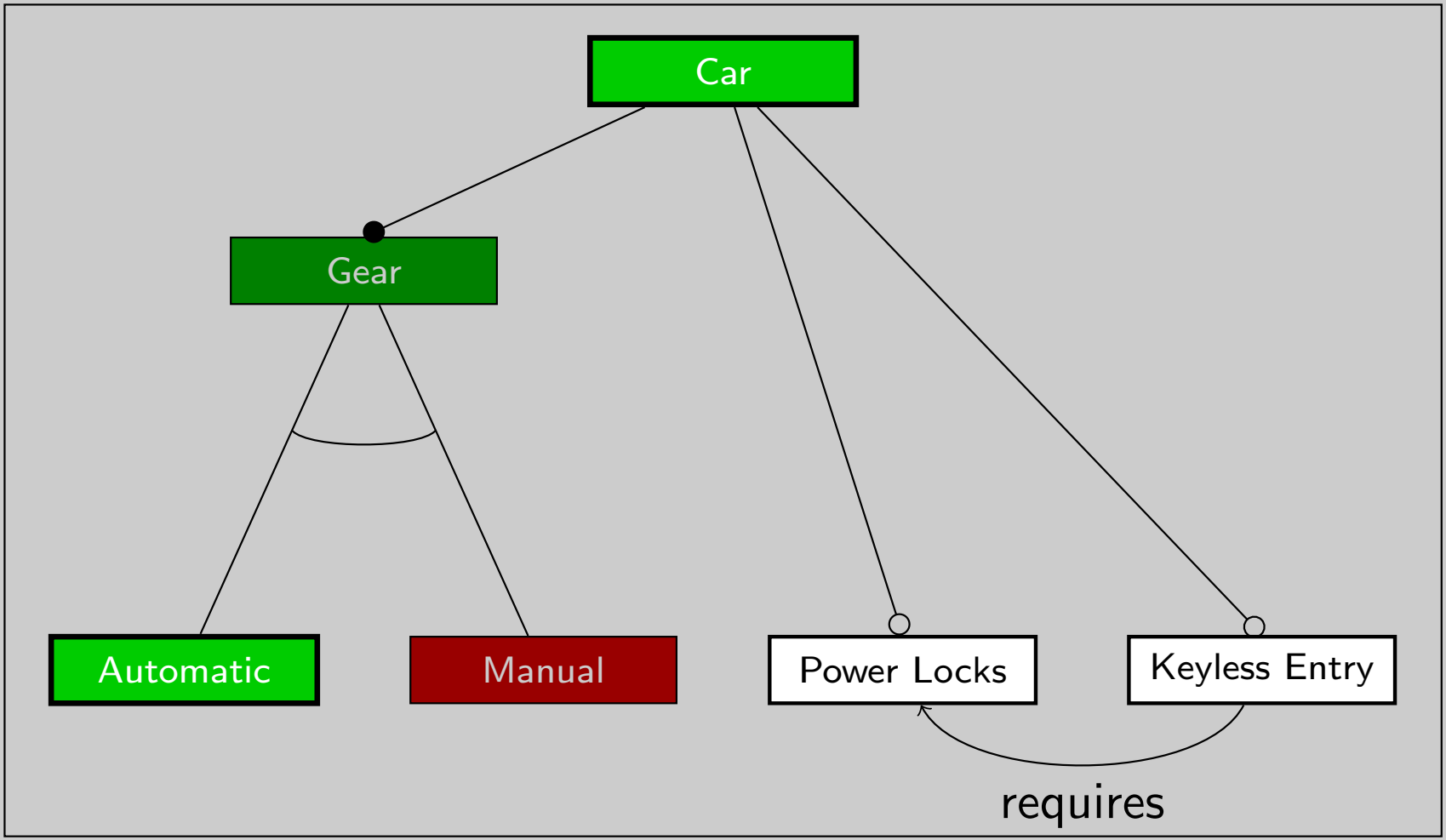

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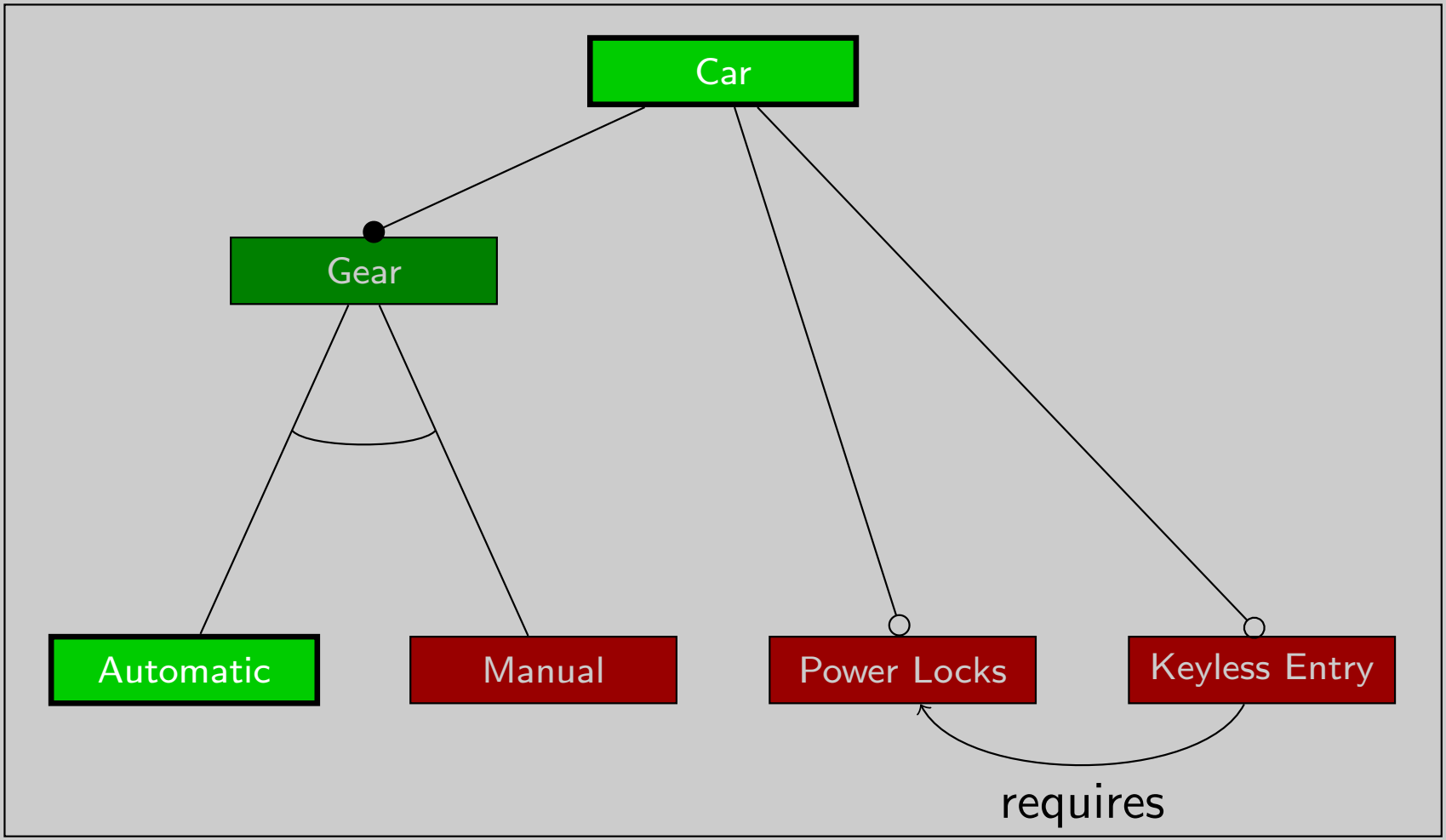

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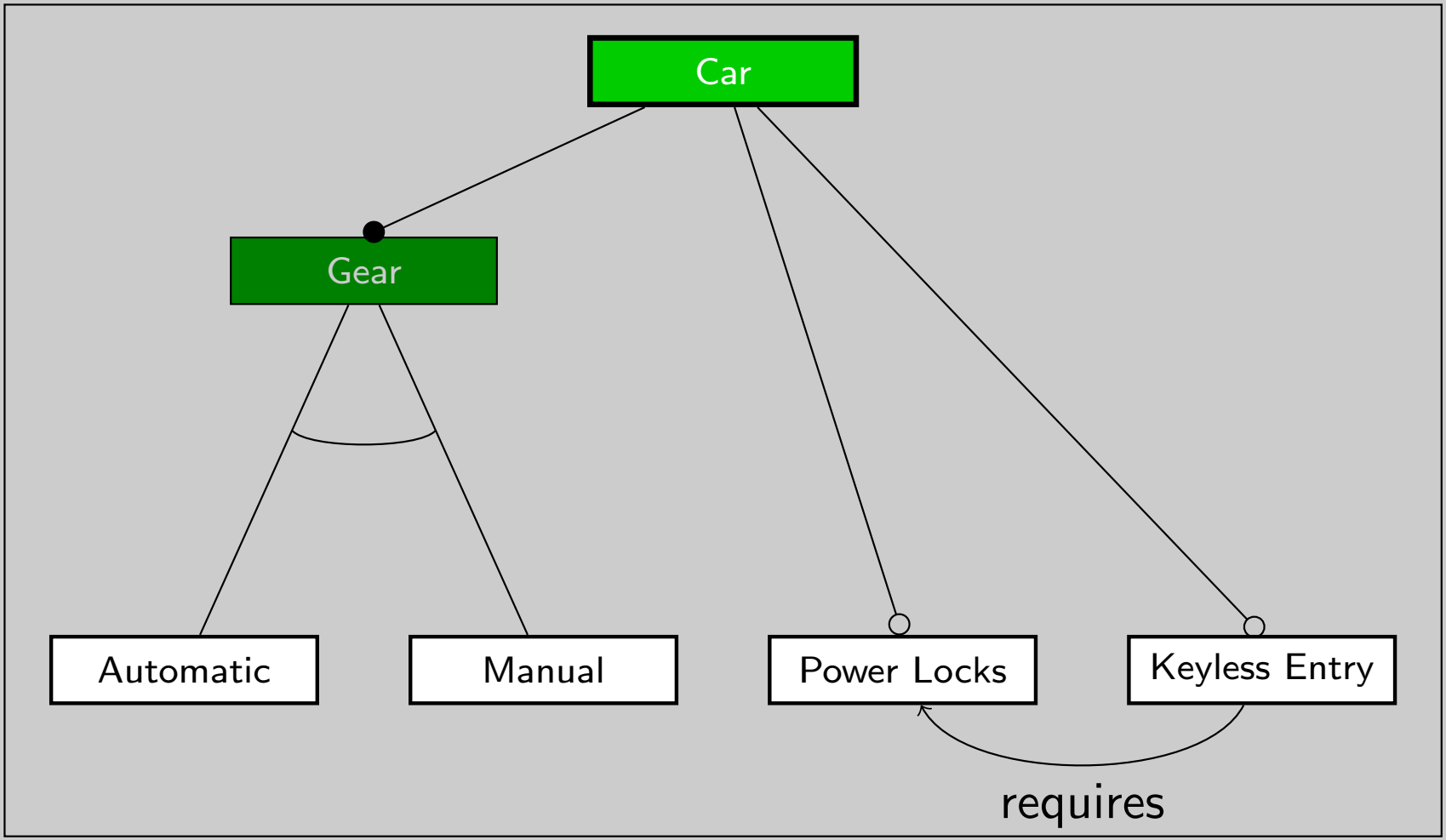

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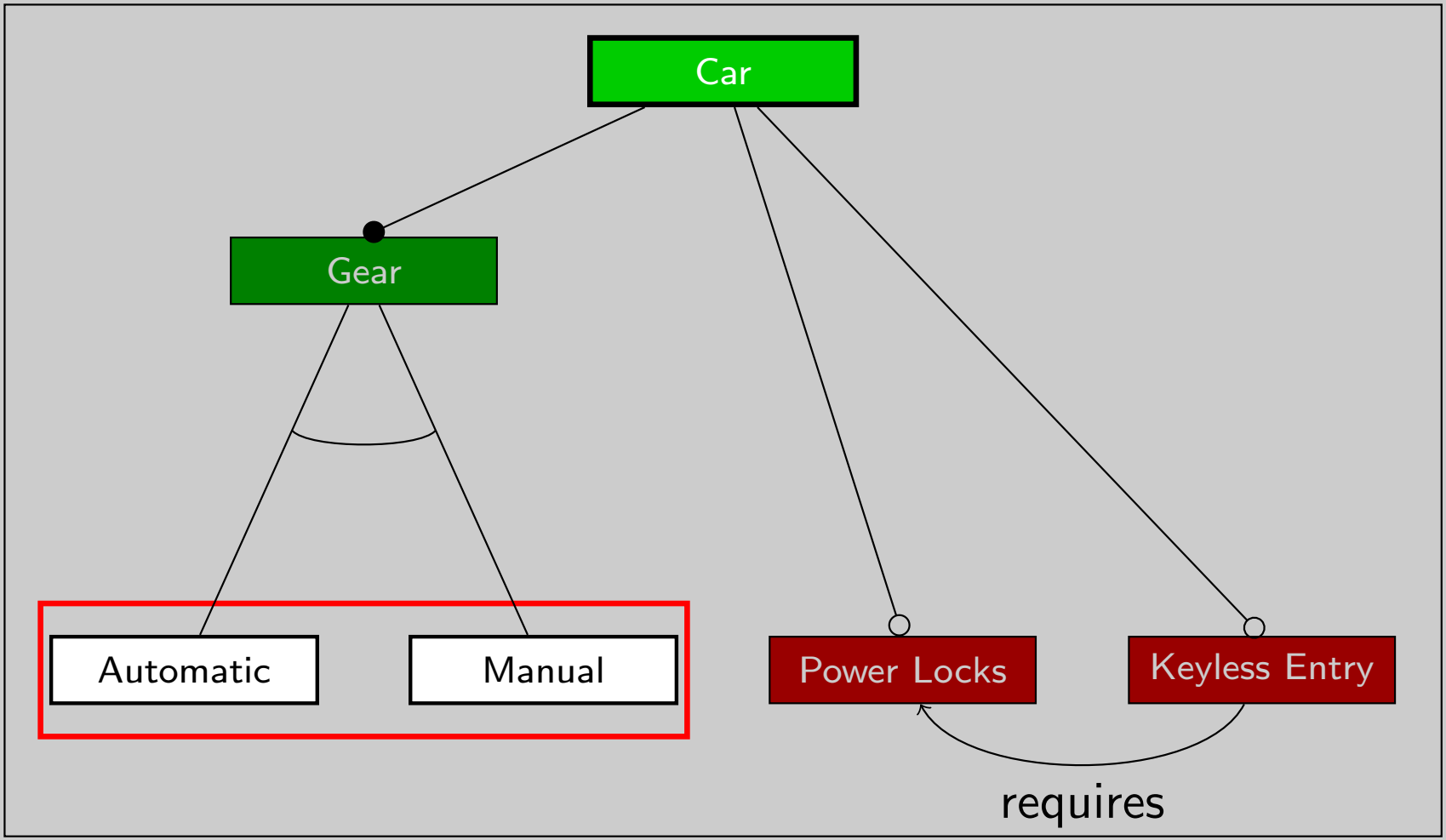

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- All features must have a value.
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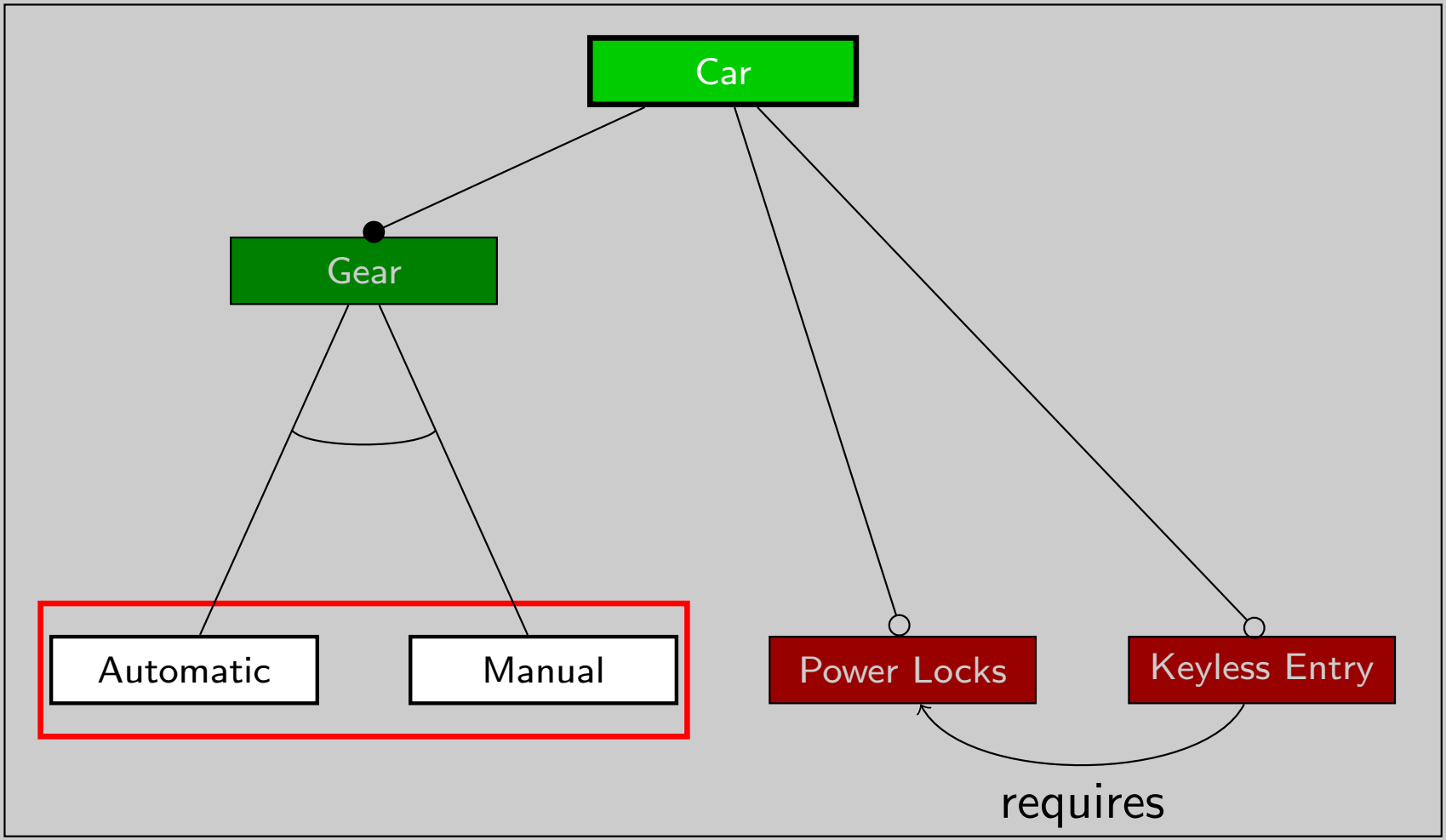
- **smart completion** — automated tool fills as much as possible *without making decisions* for the user

Smart Completion



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Decisions and Dispensable Variables

- A set of variables is deselectable *iff* they can be all deselected all at once.

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- A variable is dispensable *iff* it does not belong to any set that must be decided.

Examples

$x \vee y \vee z$

- Deselectable: $\{x, y\}$, $\{x, z\}$, $\{y, z\}$, $\{x\}$, $\{y\}$, $\{z\}$, and $\emptyset$
- Not deselectable: $\{x, y, z\}$
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$(\mathbf{x} \Rightarrow (\mathbf{y} \vee \mathbf{z})) \wedge \mathbf{x}$

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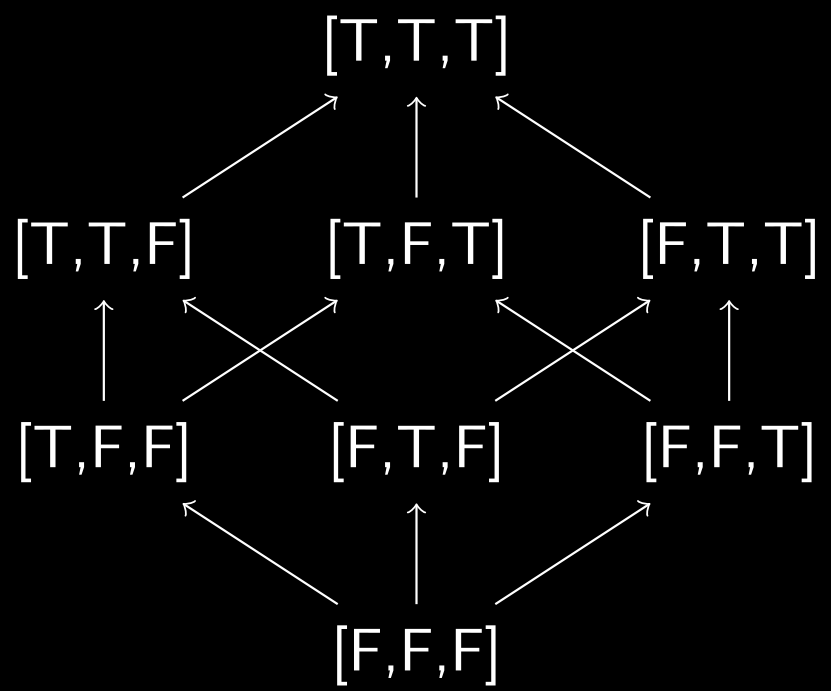

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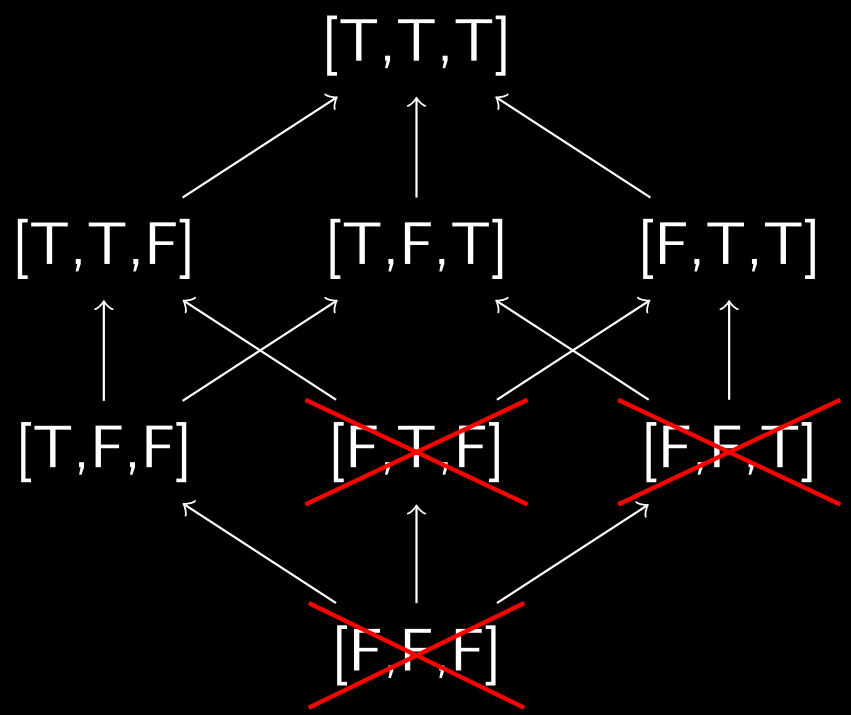

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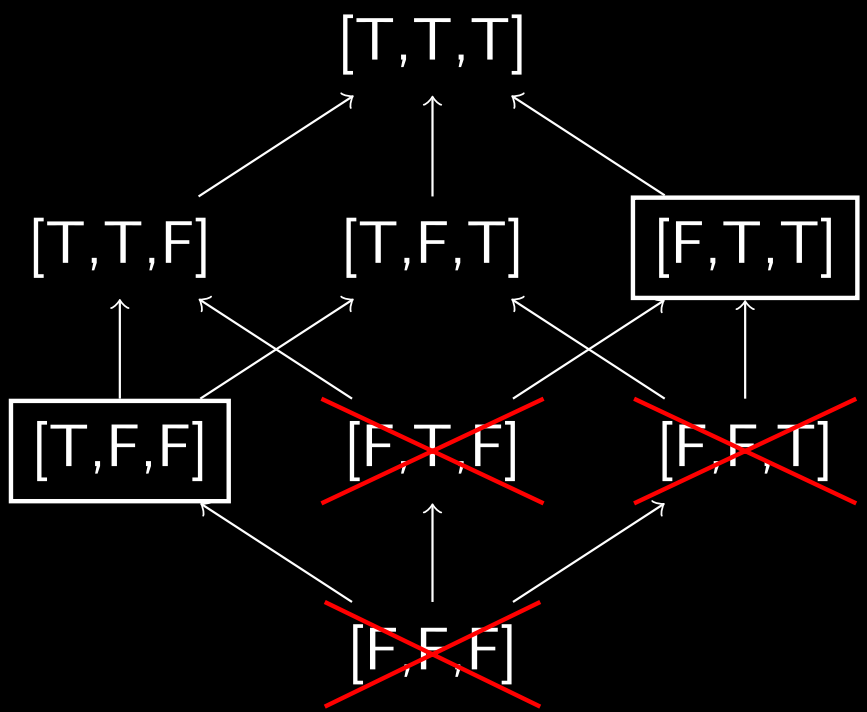

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x	**y**	**z**
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$\mathbf{x} \vee \mathbf{y} \vee \mathbf{z}$

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$\mathbf{x} \Rightarrow (\mathbf{y} \vee \mathbf{z})$

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Other Relations

Non-monotonic Reasoning

- Propositional Circumscription

$$\phi \models_{\min} \psi$$

- Generalized Closed World Assumption (GCWA)

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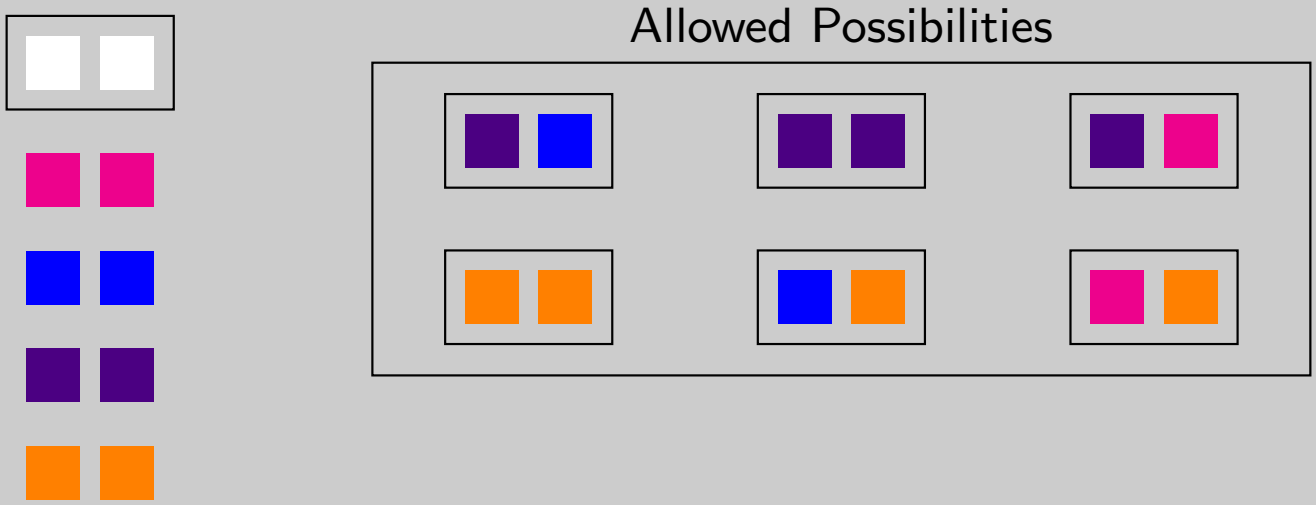
- For a general set of possibilities, it is hard to help the user.



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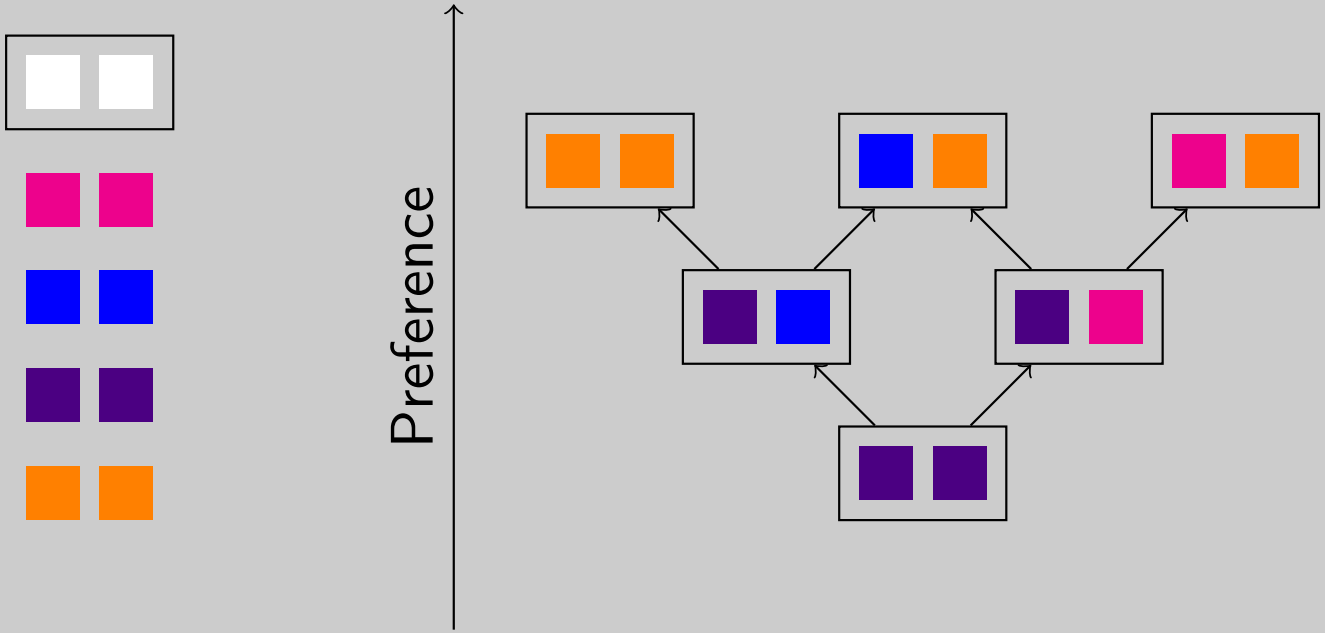

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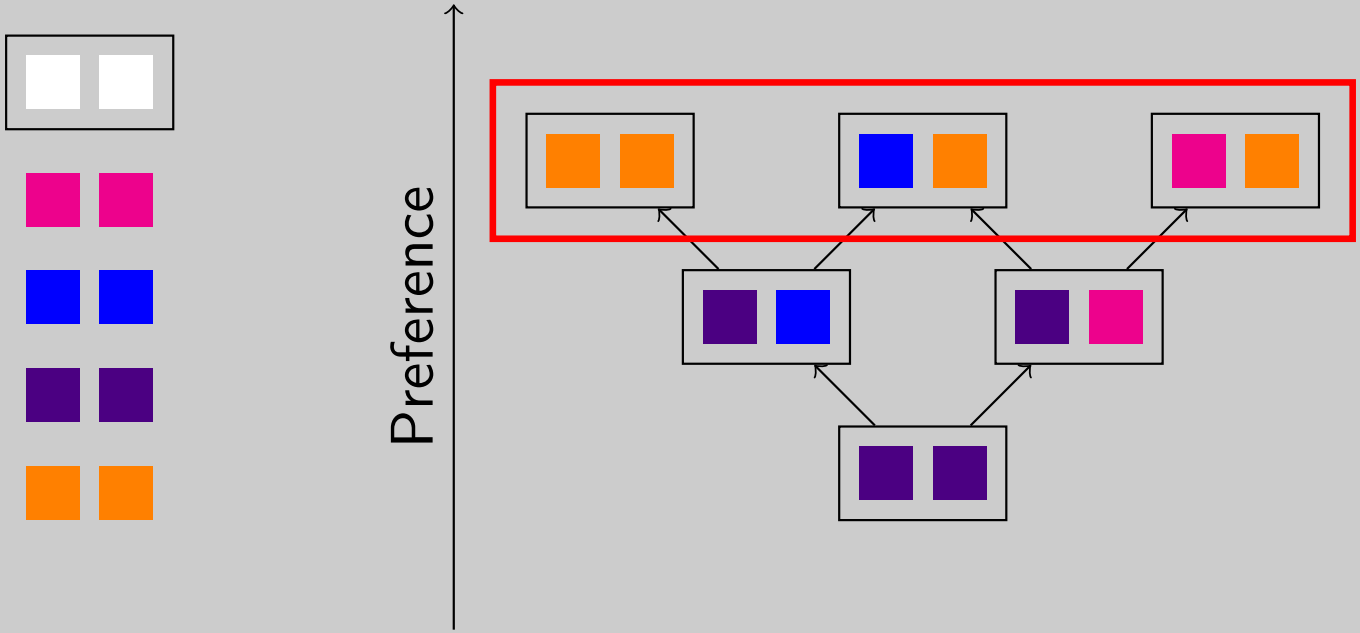

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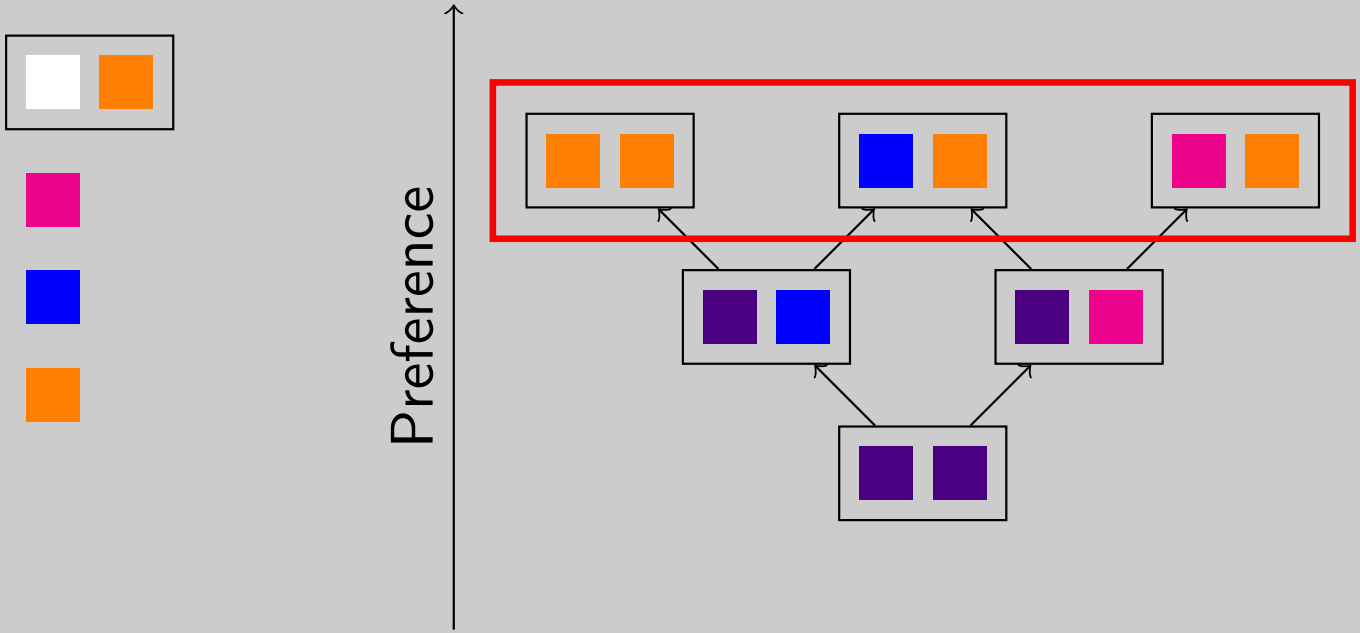

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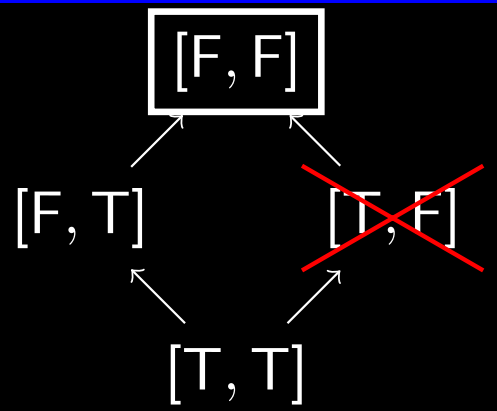
$\mathbf{x} \Rightarrow \mathbf{y}$



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- Dispensable variables are closely related to CWA.
- In non-Boolean case, smart completion can be provided in the presence of preference.
- Dispensable variables can be seen as a *preference for deselecting*.
- Analogously CWA as a preference for False.

Experimental Results

Name	Features	Clauses	Length	Done	Minimal models
tightvnc	21	22	5.5	5.5	1.0 ± 0.0
apl	27	41	12.2	11.9	1.0 ± 0.0
gg4	58	139	10.0	3.8	15.3 ± 22.6
berkeley	94	183	26.6	17.9	1.7 ± 1.1
violet	170	341	56.1	47.1	1.6 ± 0.9
E-shop	287	420	143	N/A	N/A