knowledgeweb
realizing the semantic web

Approximate Deduction

This material by
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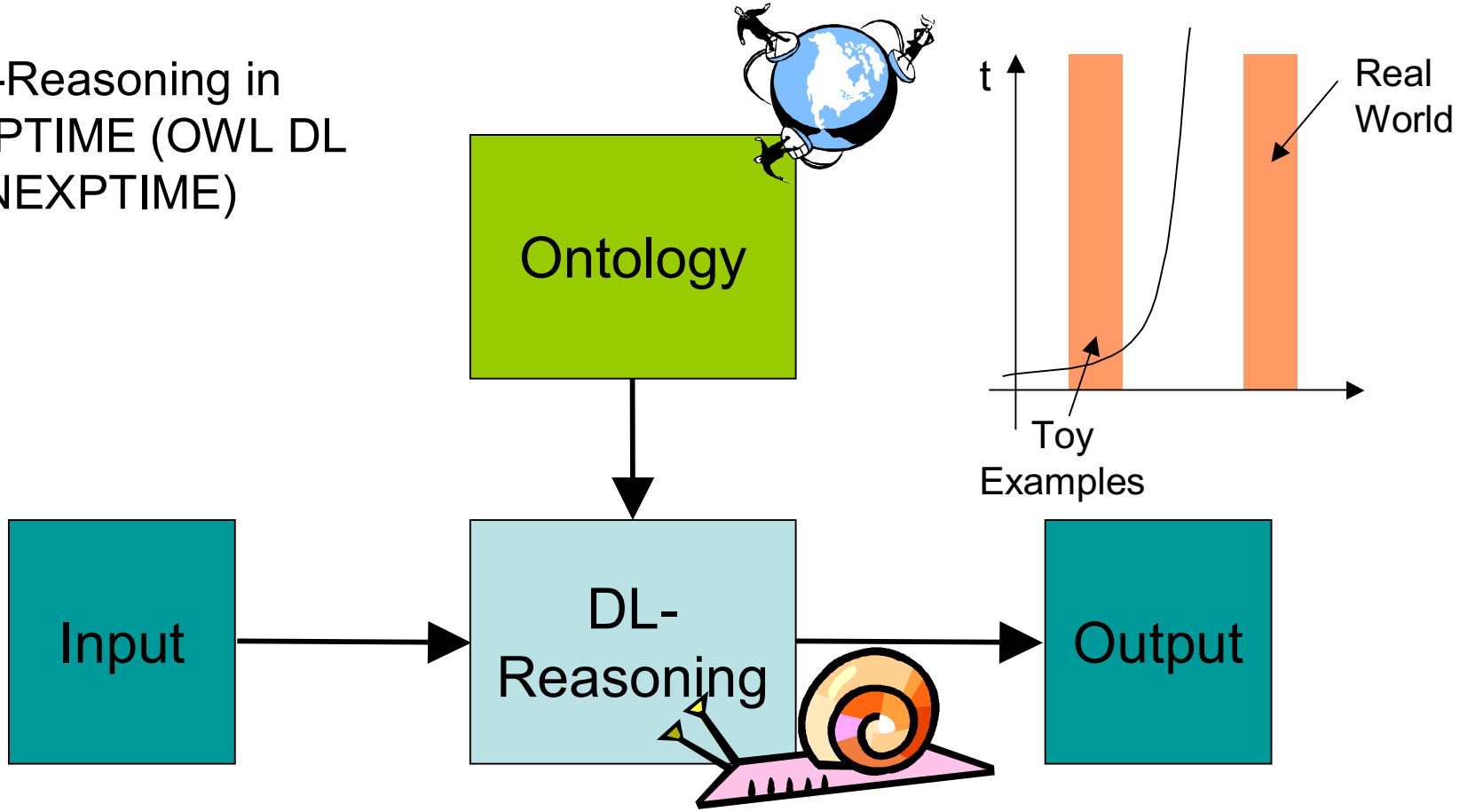
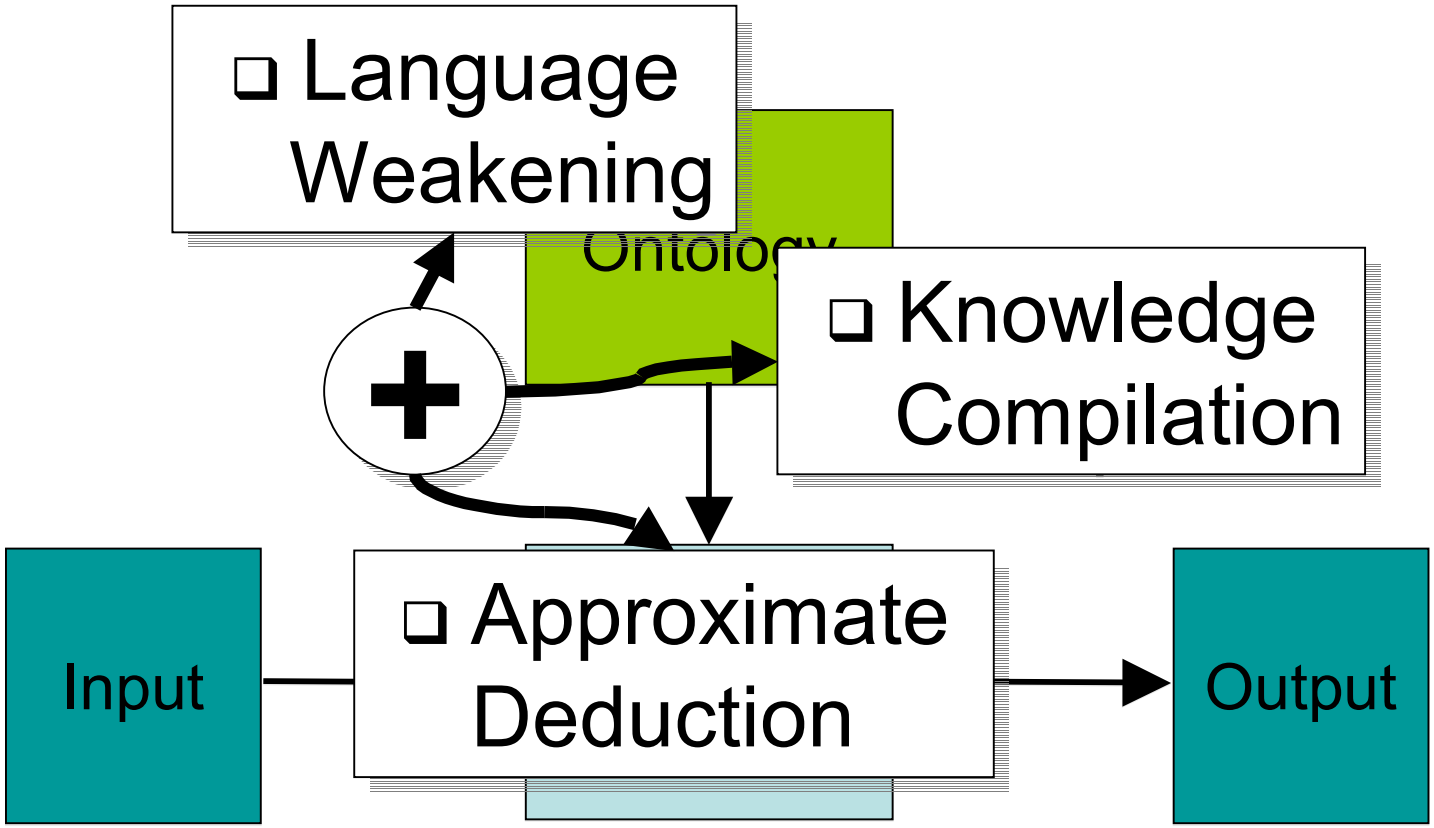
Approximation (in Semantic Web System)

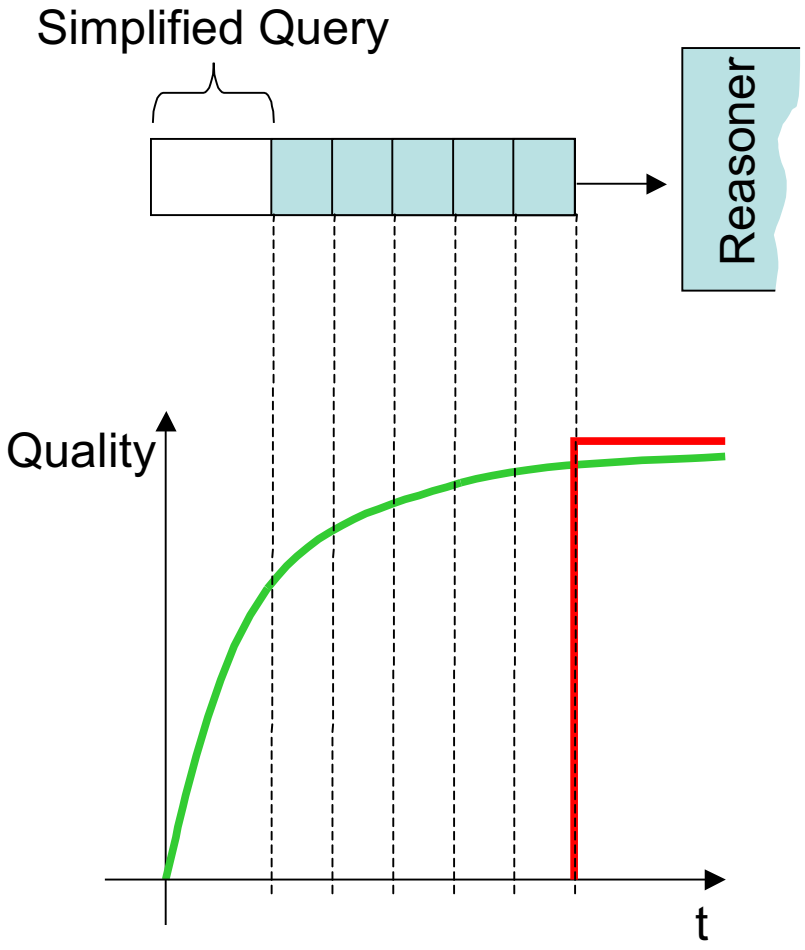
- DL-Reasoning in EXPTIME (OWL DL in NEXPTIME)



Approximation Approaches



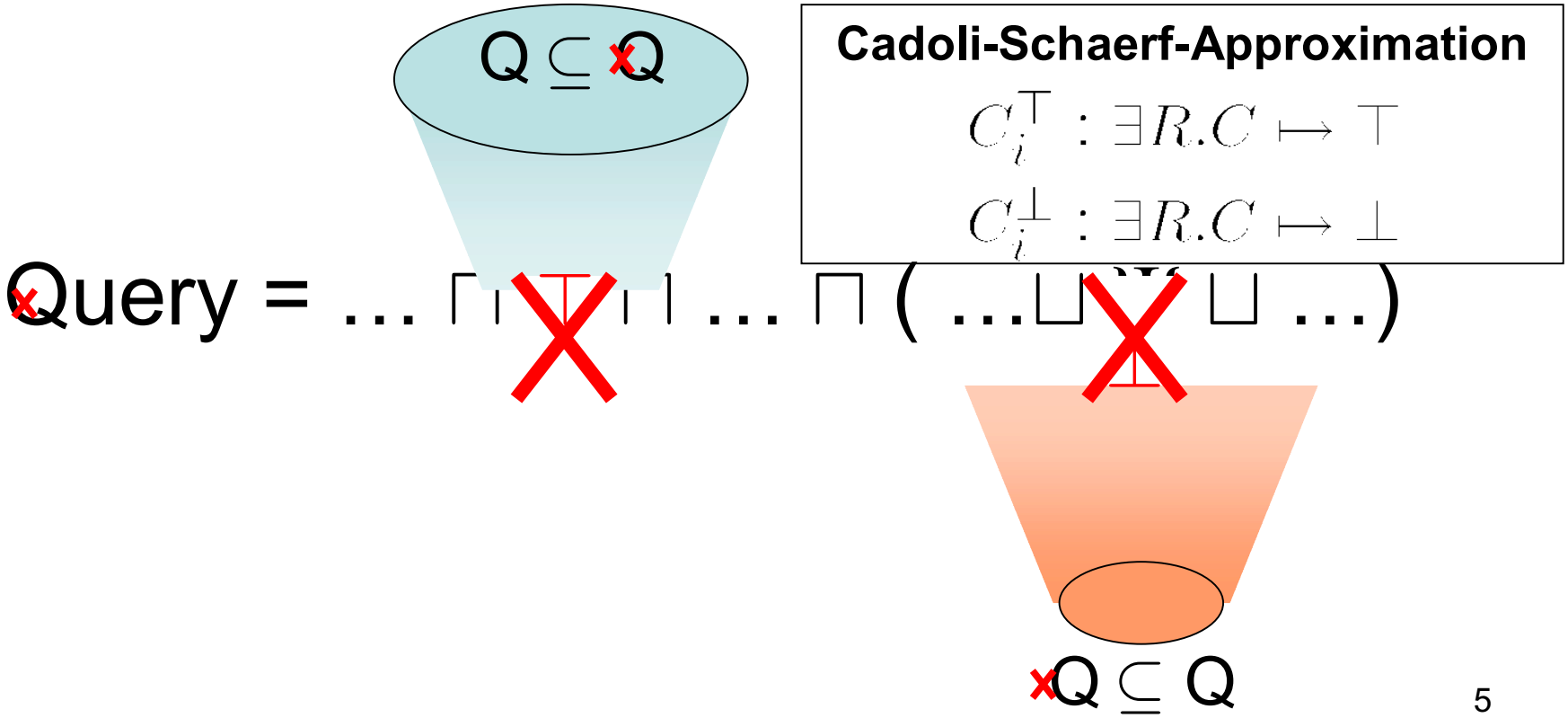
Approximate Deduction through Simplification



- Simplify query
- Simple query ⇒ fast query answering
- Simple query ⇒ approximated answers
- Incremental completion of the query
- Anytime behavior

How to simplify?

Rewrite some parts (e.g. Φ, Ψ)



Cadoli-Schaerf-Approximation for DLs

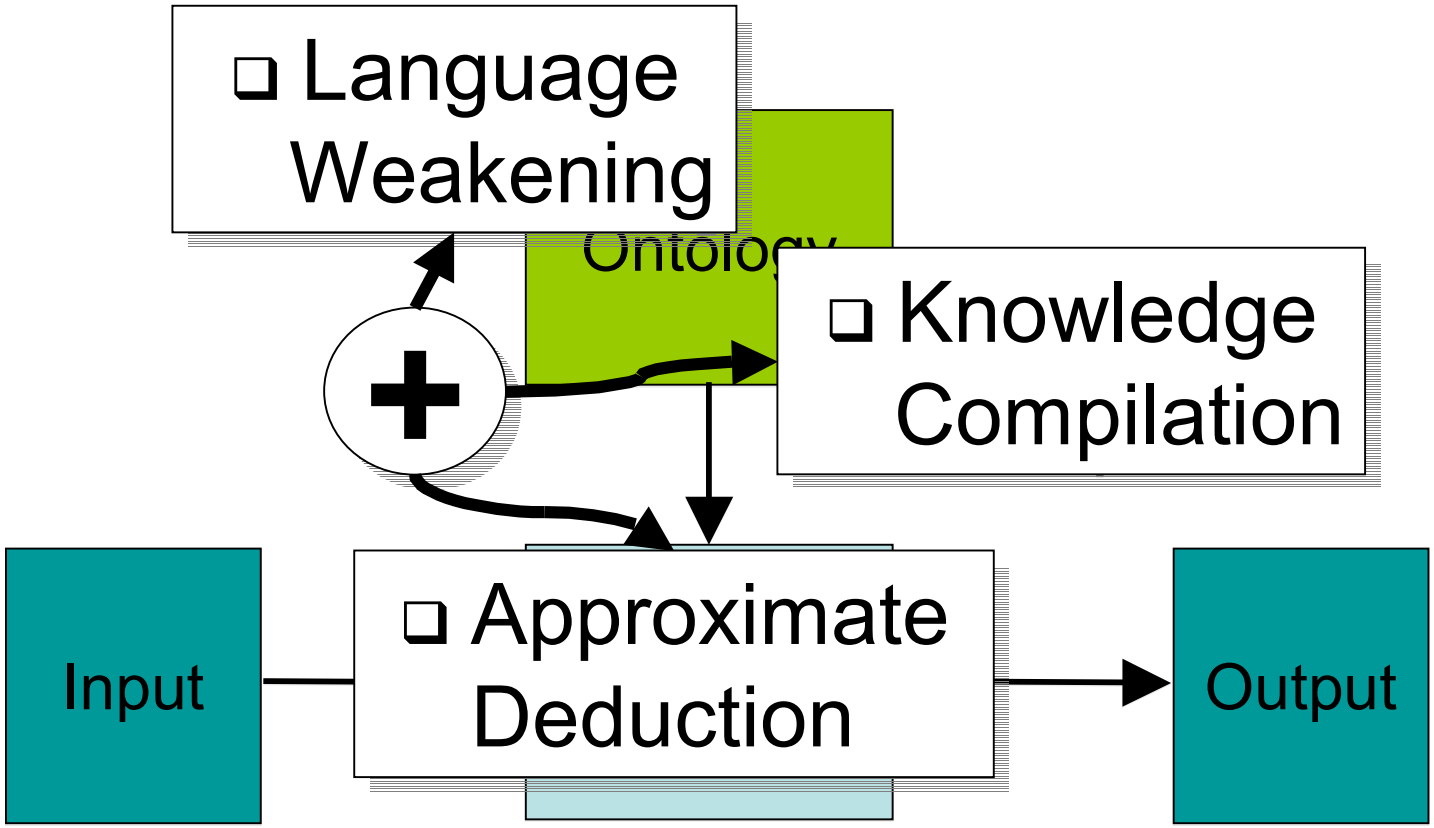
$$C_i^{\top} : \exists R.C \mapsto \top$$
$$C_i^{\bot} : \exists R.C \mapsto \bot$$

- Depth of subconcept *D*: number of universal quantifiers that have *D* in its scope.

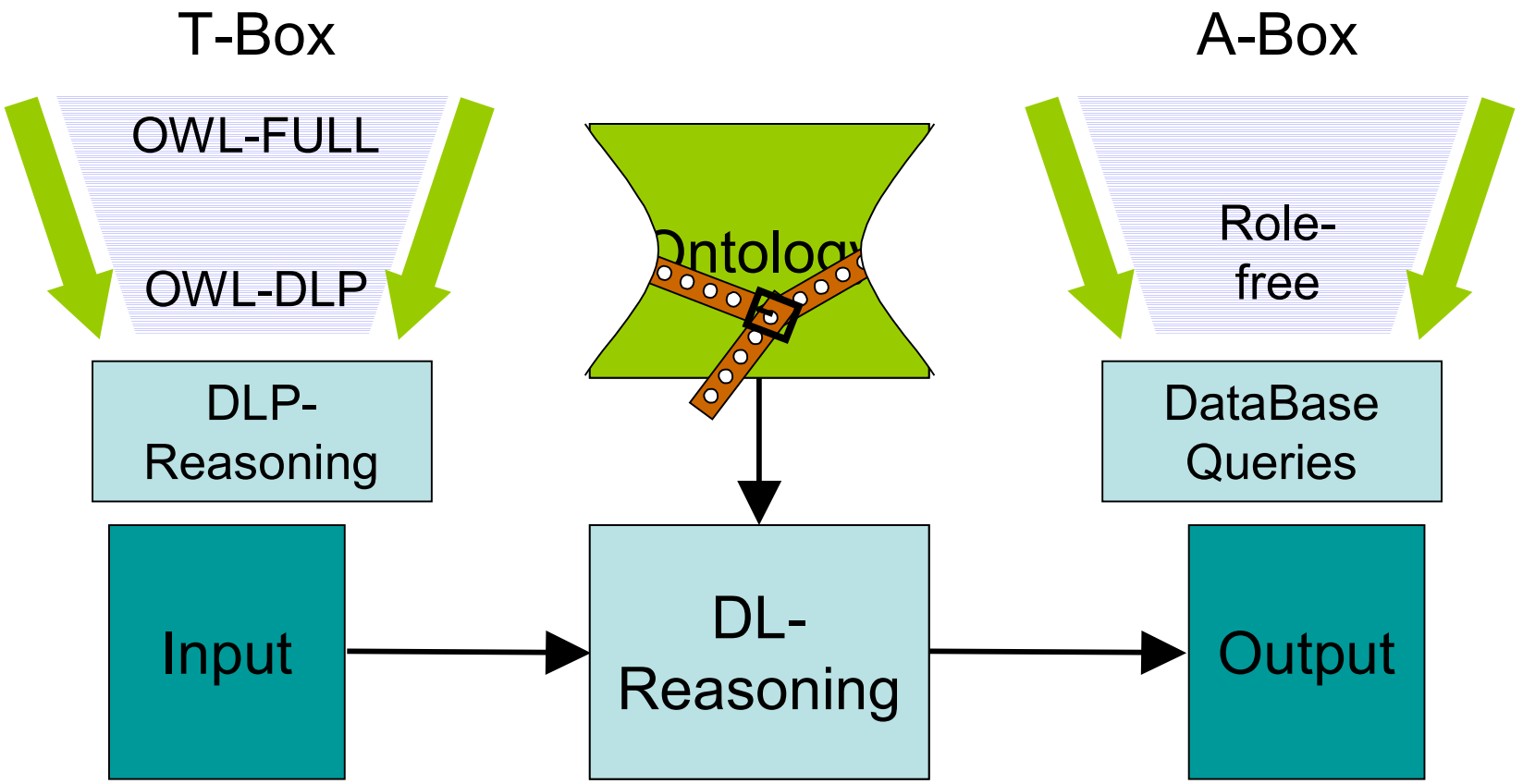
$$(\exists \text{friend.tall}) \sqcap \forall \text{friend.}((\forall \text{friend.doctor}) \sqcap \exists \text{friend.}\neg \text{doctor})$$

Depth: 0 Depth: 2 Depth: 1

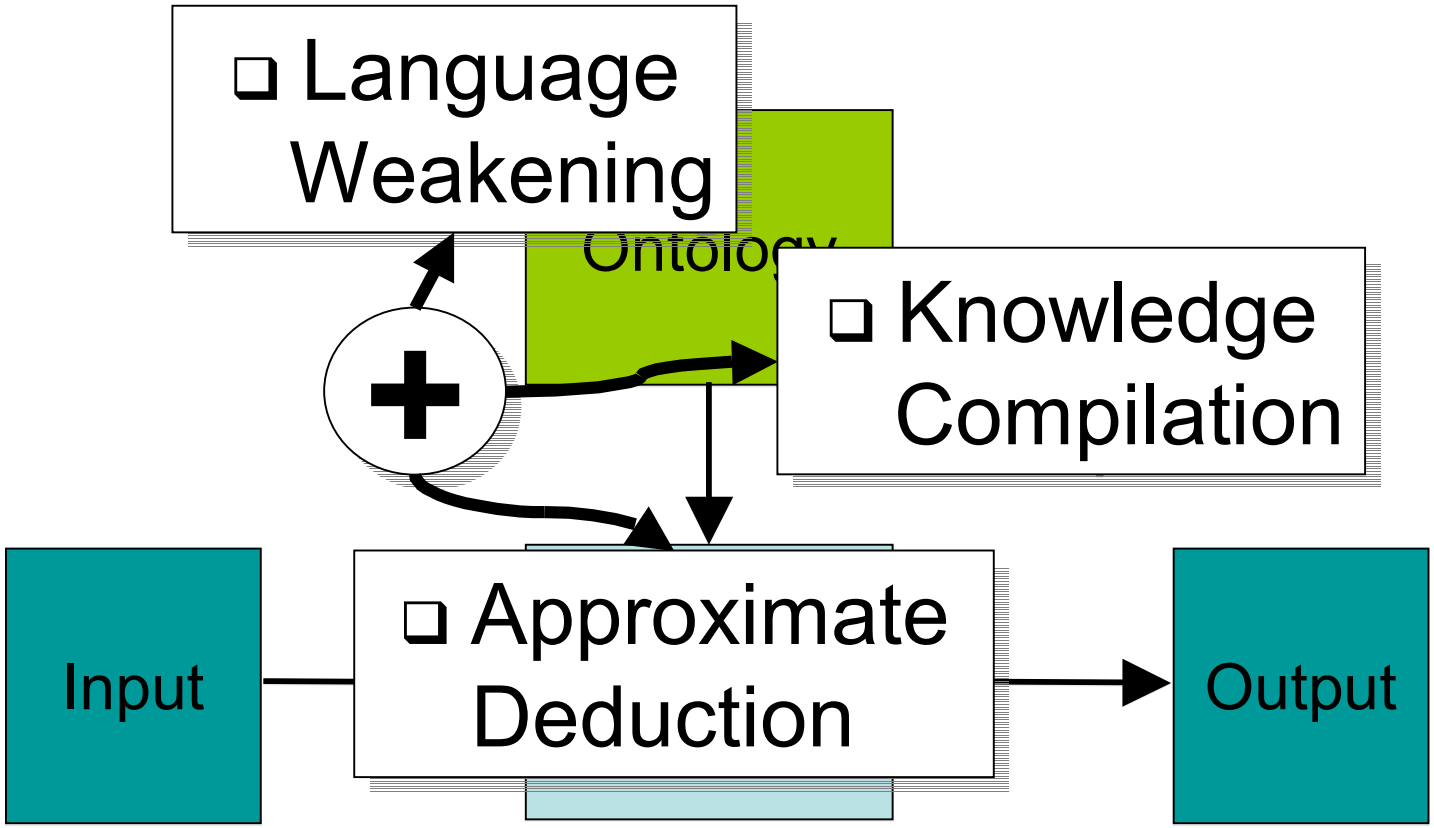
Approximation Approaches



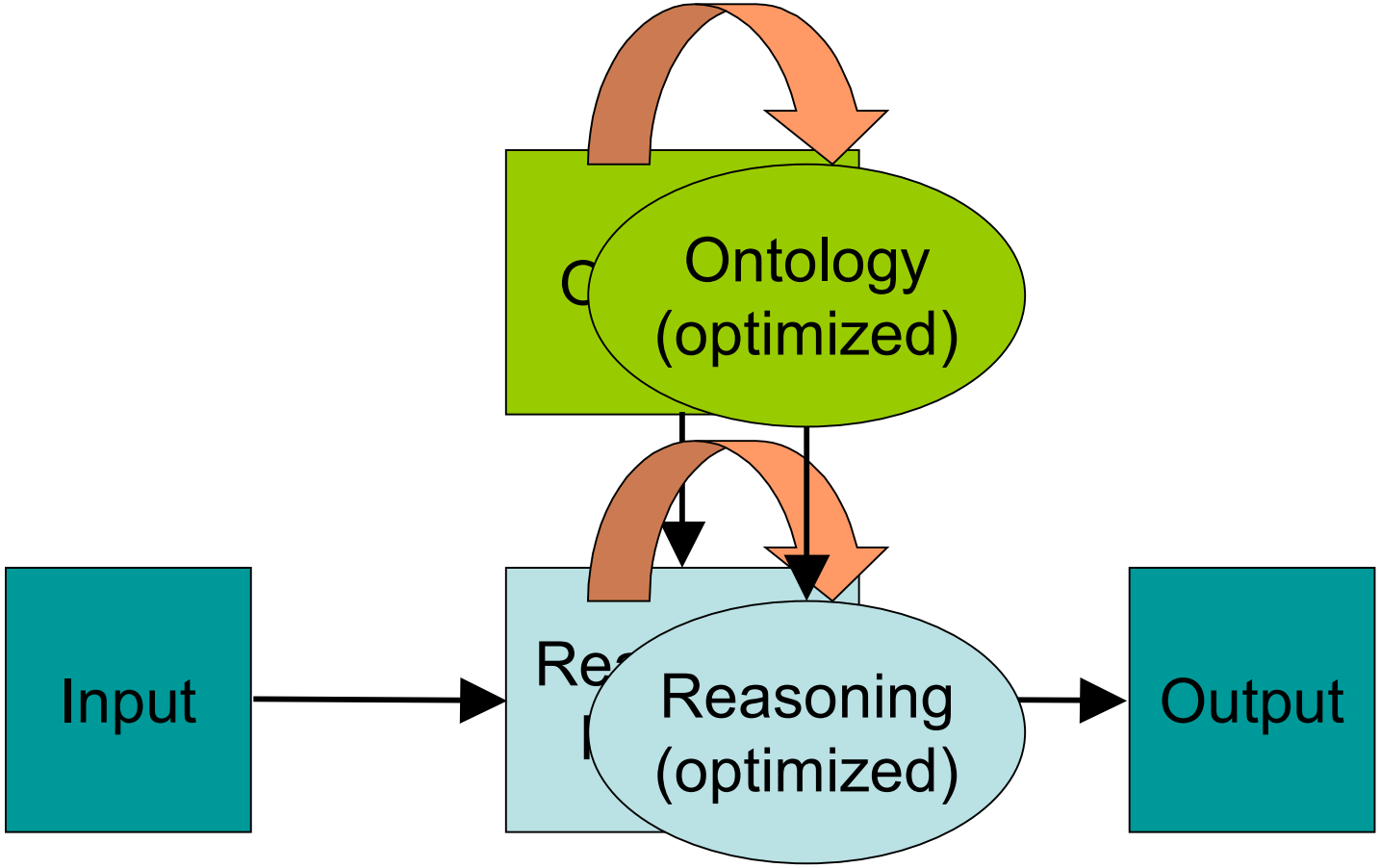
Approximation through Language Weakening



Approximation Approaches



Approximation through Knowledge Compilation



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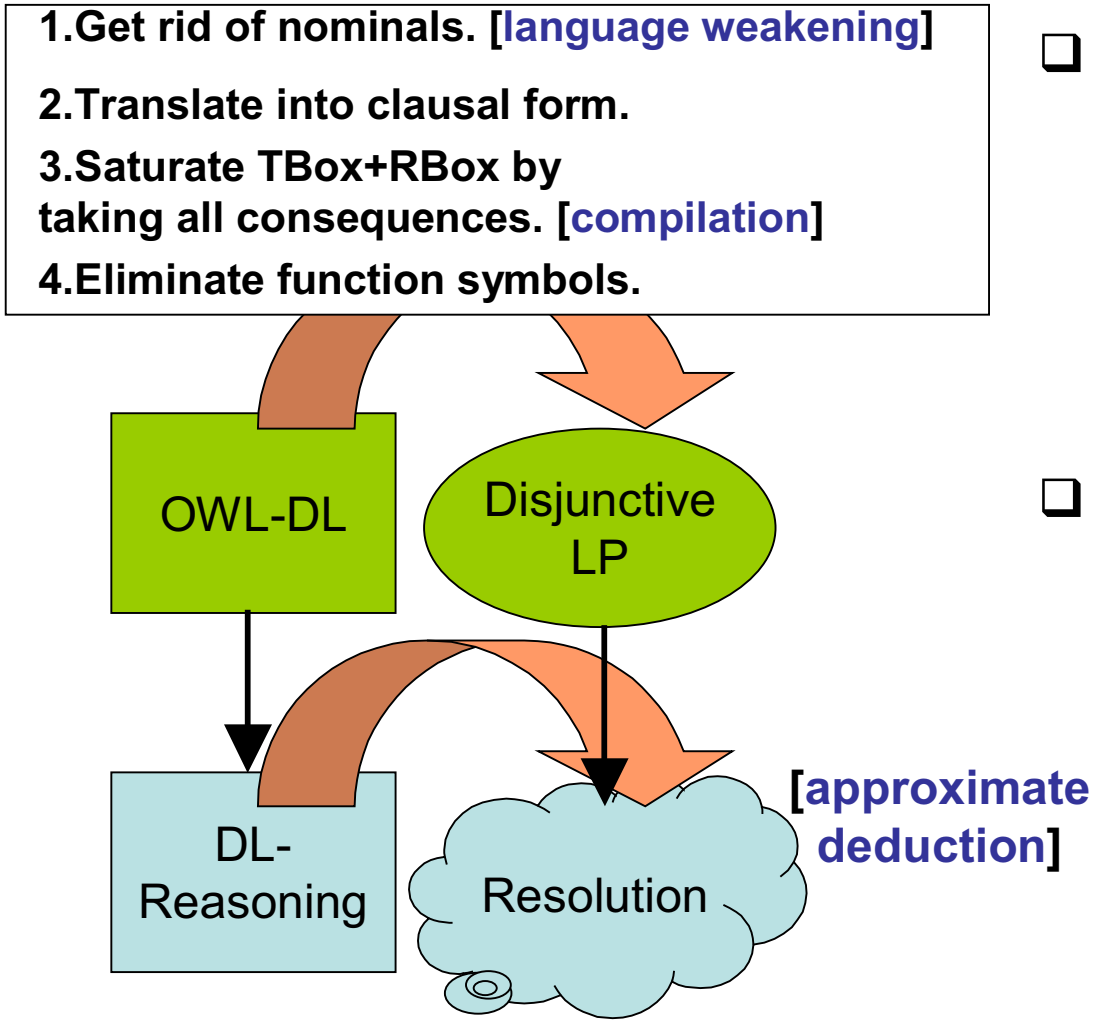
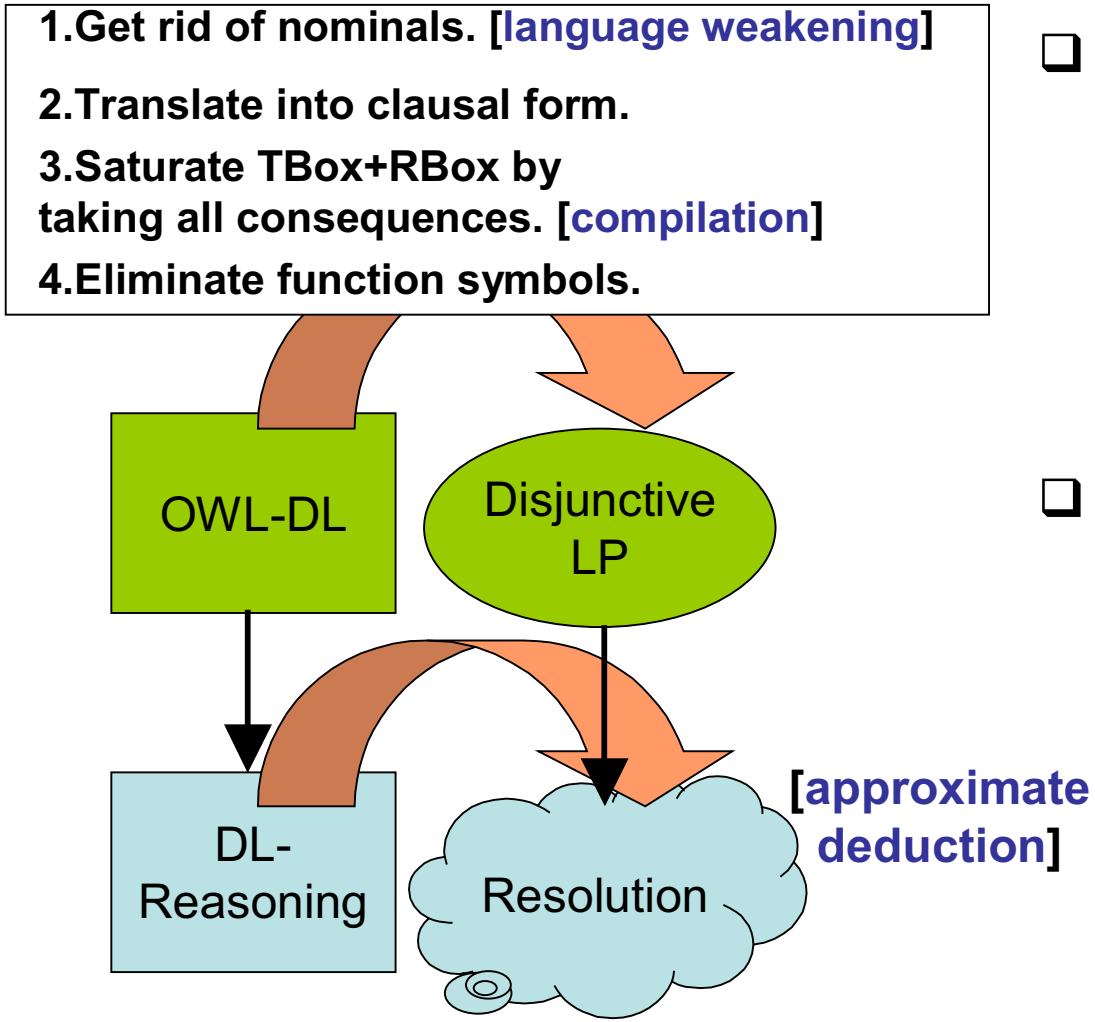


- Compile
  - OWL-DL ⇒ Disjunctive LP
  - Complete but incorrect
- Deduce
  - regarding disjunctive heads of rules as conjunctions
  - Use SLD resolution

Approximation through Knowledge Compilation



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