# Negation-as-failure considered harmful

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1. Problem
   - LP as a knowledge representation language
   - LP with Negation-as-failure
   - NAF as a knowledge representation tool
   - Semantic Web rule interchange language
2. Proposal
   - Representing defaults without NAF
   - Syntax
   - Semantics
   - Properties
3. Conclusions and future work

# Overview



- **logic programming** (LP) is not only a programming paradigm, but also provides a good language for knowledge representation

**LP rules**

$$A_0 \leftarrow A_1, \ldots, A_n$$

- it is both simple and powerful
- simplicity: several kinds of reasoning can be formalized with LP rules
- expressive power: Turing complete if functions are allowed

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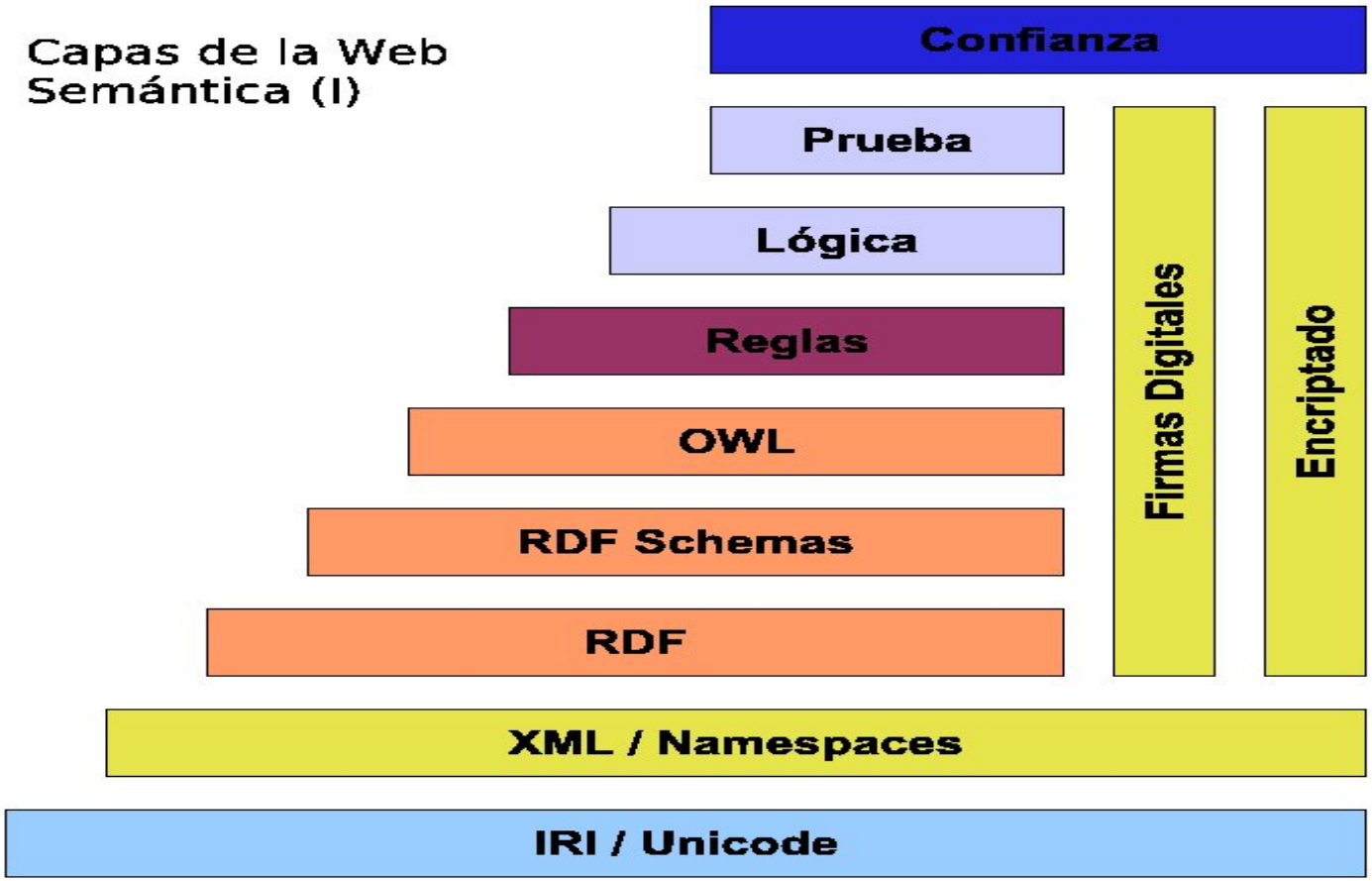
- rules with defaults are being integrated into the Semantic Web framework



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- so we propose a LP language without NAF but including nonmonotonic reasoning
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- a second order predicate $\texttt{def}(\cdot)$ is added to the language
- for example,

$$\texttt{def}(\texttt{delayed}(\texttt{flight123})) \leftarrow$$

represents that $\texttt{delayed}(\texttt{flight123})$ is being considered a default fact

- these new atoms can be used anywhere in rules

LP rules with default policies

$$\pm A_0 \leftarrow \pm A_1, \ldots, \pm A_n$$

- any atom $A_i$ may contain the $\texttt{def}(\cdot)$ predicate

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- both answer sets and well founded model semantics can be stated in this framework
- The set of default literals of $\Pi$ with respect to $C$ is the set

$$\mathrm{Def}_{\Pi}(C) := \{L : \mathtt{def}(L) \in \mathbf{Cn}(\Pi) \wedge \bar{L} \notin C\}$$

- $S$, a set of literals, is called an answer set of $\Pi$ if it satisfies

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- but we can observe a more disciplined use of NAF that in the translated extended logic program
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- clear separation of the roles of negation and nonmonotonic inferences
- this is desirable for the future rule interchange language standard of W3C
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