

$$\Omega_0 = \{ \perp, \top \}$$

$$\Omega_1 = \{ \neg \}$$

$$\Omega_2 = \{ \wedge, \vee, \rightarrow, \leftrightarrow \}$$

 $\mathcal{L}(A, \Omega, Z, I)$ 

Propositional logic

First-order logic

add.  $\exists, \forall$  var $\exists, \forall$  set

Monadic second-order logic

 $\exists, \forall$  relation

Second-order logic

proven in 1990

Courcelle's theorem

- every graph property
- definable in the monadic second-order logic of graphs
  - can be decided in linear time on graphs
  - of bounded treewidth