Temporal logic

- Varieties of temporal logic
  - Linear time vs branching time
  - Points vs intervals
  - Discrete vs continuous (dense)
  - Past vs future

(Prop.) Linear temporal logic

- Formulas
  - propositional atoms in a set $\text{At}$
  - $\bigwedge \phi_1, \phi_2$ formulas $\bigwedge$
  - $\bigwedge \phi_1, \phi_2, ...$ formulas
  - $\phi_1, \phi_2$ formulas $\bigwedge$
  - $\phi_1 \bigwedge \phi_2 \bigwedge \phi_3, \bigwedge \phi_4$, formulas

(P)LTL : semantics

- Models: linear-time structures $M = (S, s, p)$ where
  - $S$ is a set of states
  - $s: N \rightarrow S$ is an infinite sequence of states
  - $p: S \rightarrow \mathit{P(At)}$: truth assignment function

  Notation: $s_i = s(i)$ and
  $\square$ is the suffix $<s_i, s_{i+1}, ...>$

PLTL semantics

Given $M = (S, s, p)$,

- $M, s \models P \sqcap (P \sqcap (\square \text{At}))$
- $M, s \not\models \square \phi$ and
  - for all $0 \leq j < k$: $M, s_j \models \square \phi$, or
  - for all $j \geq 0$: $M, s_j \models \square \phi$

(weak until)