

## Two semantic relations

Let  $\varphi$  be an LTL formula,  $\alpha$  an observation sequence, and  $t \in \mathbb{N}$  a time point:

$$(\alpha, t) \models \varphi$$

( $\varphi$  holds for  $\alpha$  at time  $t$ );

$$\alpha \models \varphi \iff (\alpha, 0) \models \varphi$$

( $\varphi$  holds for  $\alpha$ ).

### Future connectives

- $\Box \varphi$  (**always**  $\varphi$ )  
 $(\alpha, t) \models \Box \varphi \iff \forall s \geq t : (\alpha, s) \models \varphi$
- $\Diamond \varphi$  (**eventually**  $\varphi$ )  
 $(\alpha, t) \models \Diamond \varphi \iff \exists s \geq t : (\alpha, s) \models \varphi$
- $\otimes \varphi$  (**next**  $\varphi$ )  
 $(\alpha, t) \models \otimes \varphi \iff (\alpha, t+1) \models \varphi$

### Past connectives

- $(\alpha, t) \models \blacksquare \varphi \iff \forall s \leq t : (\alpha, s) \models \varphi$
- $\blacklozenge \varphi$  (**once**  $\varphi$ )  
 $(\alpha, t) \models \blacklozenge \varphi \iff \exists s \leq t : (\alpha, s) \models \varphi$