

Directed Model Checking for Timed Automata

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What is Model Checking?

Model Checking:

Automatically checks if a **system** meets a **property**

$$\text{System} \stackrel{?}{\models} \text{property}$$

System:

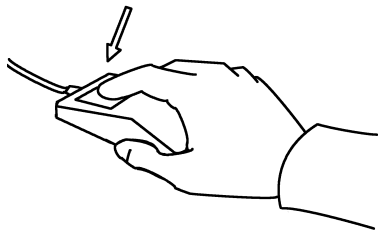
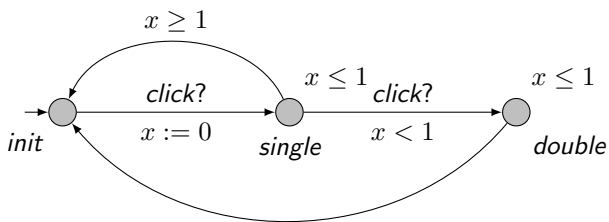
Modeled as Kripke structure, here **timed automata**

Property:

Specified in **temporal logic**

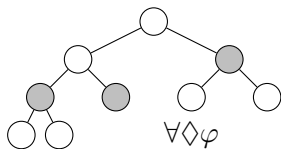
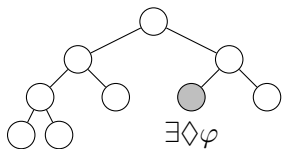
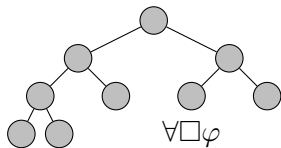
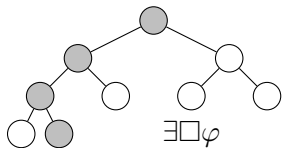
What are Timed Automata?

Modeling Real-time Systems



Temporal Logic

Computation Tree Logic



Where is the Connection to Planning?

Model Checking:

1. **Goal:** prove application error-free
2. **Problem:** suffers from **state explosion**

Directed Model Checking:

1. **Idea:** instead of $M \stackrel{?}{\models} \forall \square \varphi$ prove $M \stackrel{?}{\not\models} \exists \diamond \neg \varphi$
2. Application of **heuristic search** to **model checking**
3. Tailored to fast detection of **bugs**

What am I doing here?

Directed Model Checking for Timed Automata

1. Directed model checkers
2. AI planning heuristics
3. Pattern databases
4. Abstraction refinement
5. Transition-based DMC
6. ...

The End

*kein fehler im system
kein fehler imt sysem
kein fehler itm sysem
kein fehler tmi sysem
kein fehler tim sysem
kein fehler mti sysem
kein fehler mit sysem*

[Eugen Gomringer, Kein Fehler im System]