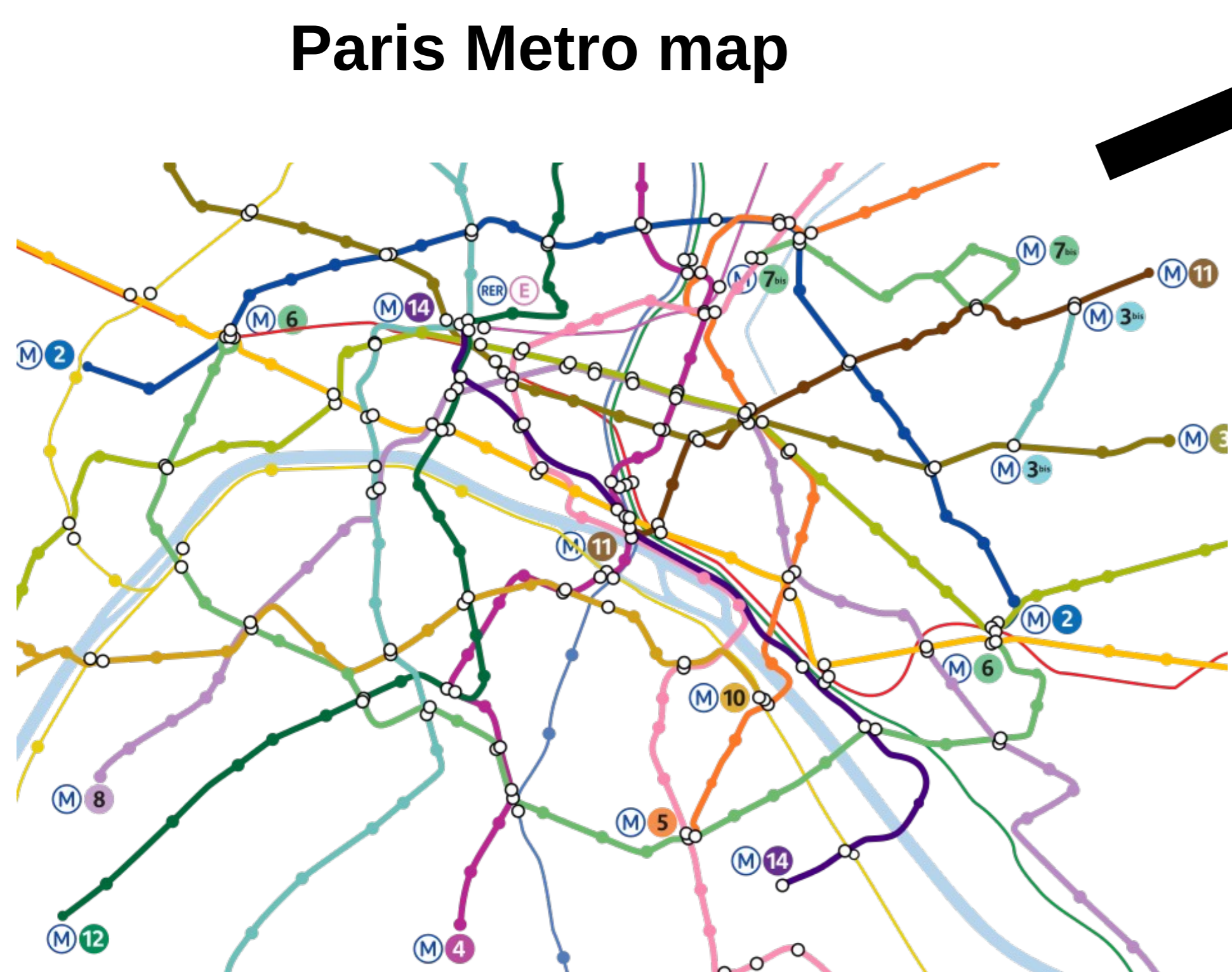


Combined Tractability of Query Evaluation via Tree Automata and Cycluits

Antoine Amarilli, Pierre Bourhis, **Mikaël Monet**, Pierre Senellart



Database of bounded treewidth



Stratified Datalog query

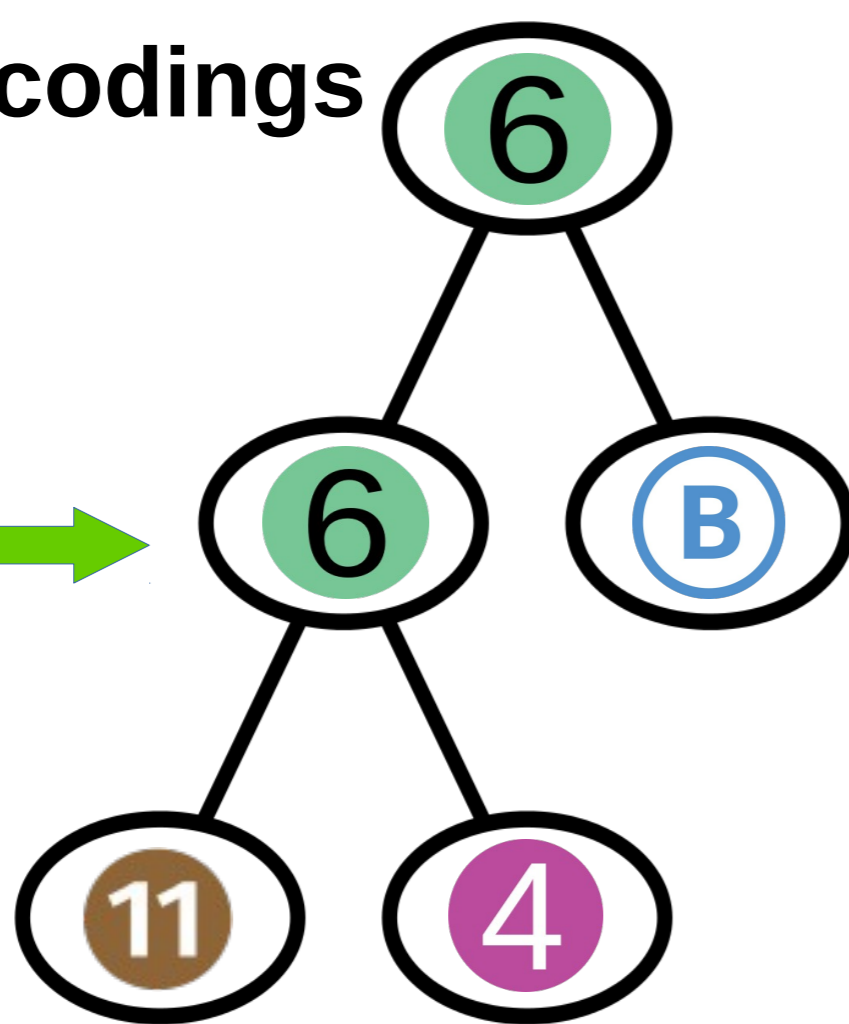
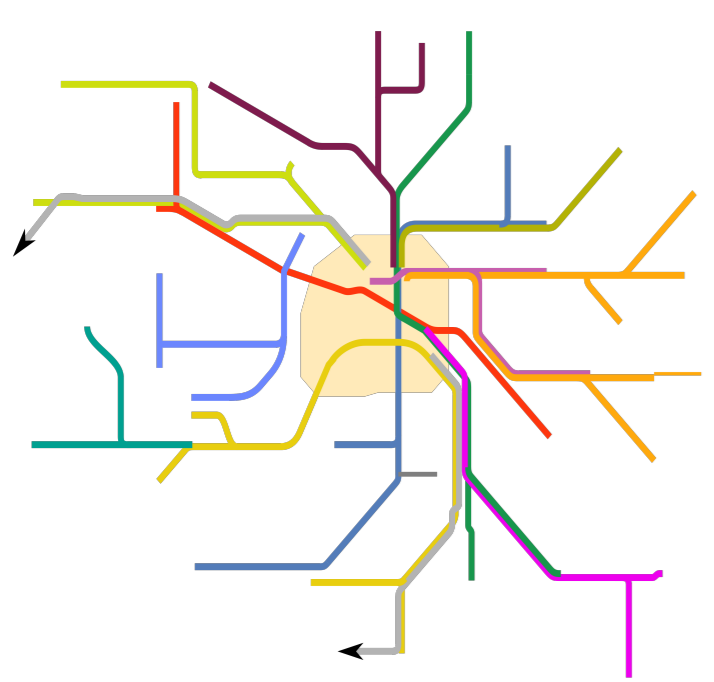
- 1 $C(x) : \text{Subway}(\text{"Corvisart"}, x)$
 $C(x) : C(y) \text{ AND } \text{Subway}(y, x)$
- 2 $\text{Goal}() : \text{NOT } C(\text{"Châtelet"})$

Linear-time

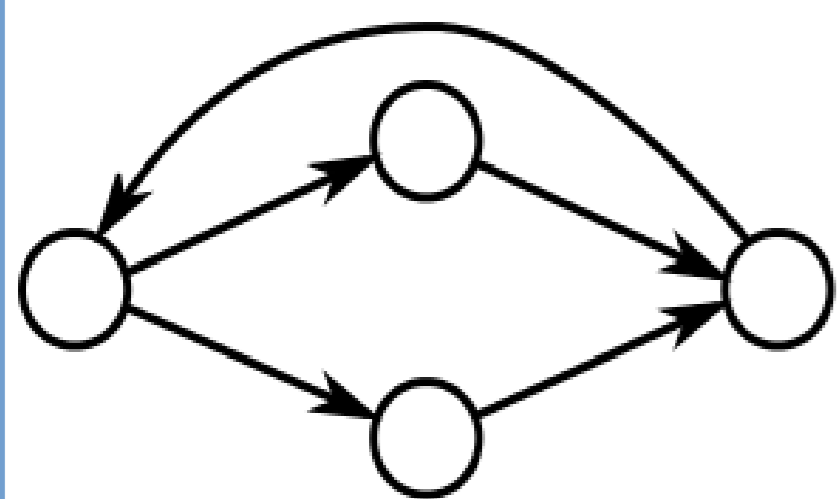
“Under which conditions is it impossible to go from station Corvisart to station Châtelet with the subway?”

Tools

Treewidth, tree encodings

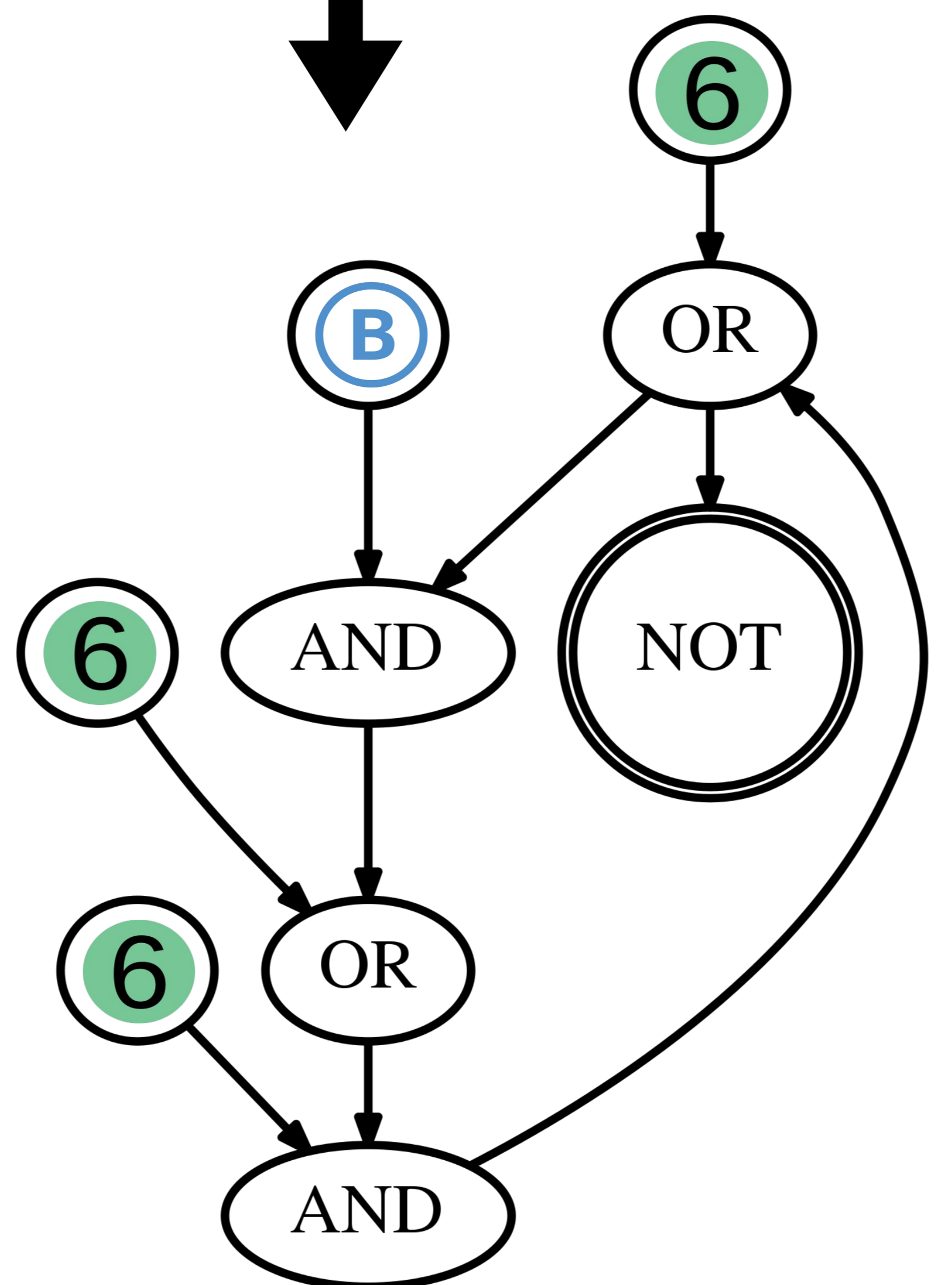


Two-way Alternating Tree Automata



Generalisation of regular expressions to trees

- + multidirectional navigation
- + alternation



Cyclic Provenance Circuit (Cycluit)

About provenance

Inputs: The tuples of the Instance

Output: Is the query true for the subinstance considered?

Semantics: least fixed-point

Boolean Evaluation: linear time!



Beware of cycles with negations!

Applications

“Can I go from A to B using only Tram and Bus?”

“Can I go from A to B knowing that the Subway line 7 is down?”

Probabilistic Querying: “What is the probability that I can go from A to B, given the probabilities for each line to be down/late?”