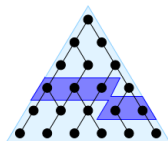


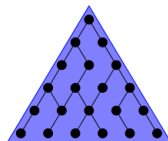
# CTL intuitively

finally  $P$



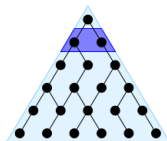
$AF P$

globally  $P$



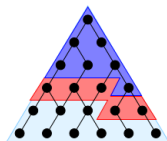
$AG P$

next  $P$

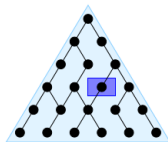


$AX P$

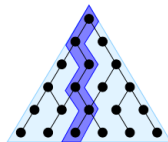
$P$  until  $q$



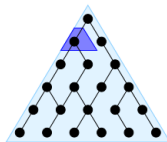
$A[P U q]$



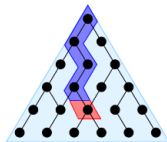
$EF P$



$EG P$



$EX P$



$E[P U q]$

(C) Alessandro Artale

Express in CTL and in LTL if possible:

- Whenever system receives a request *Req* then it generates an acknowledgement *Ack* eventually
- In every run there are infinitely many *b*
- A state where *a* is true, but *b* is not, is reachable
- There is always an option to reset the system (reach state *Restart*)

Express in CTL:

- All the paths lead to Rome
- All the time if I did not loose, then I have a move where I do not loose
- All the time if I get robbed then I can react by defending myself or not defending myself

Read CTL formula:

- $AG[\text{error} \implies E(\text{repair } U \text{ operational})]$
- $AG[\text{error} \implies A(!\text{error } W \text{ operational})]$
- $AG[EF(\text{restart})]$
- $A[p \ U \ A(q \ U \ r)]$