Formal methods - Temporal logic

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We can see Kripke structure as a infinite set of computation paths and as an infinite computation tree.

1 LTL

When we reason on LTL we reason on a signle path.

1. X : next, $X\phi$ is true iff $\phi + 1$ is true
2. G : globally $G\phi$ is true iff ϕ is true **from now** on **forever**
3. F : finally, $F\phi$ is true if sooner or later ϕ will be true, it could be also the current state.
4. U : until, $\phi U\psi$ is true if sooner or later ψ is true (even now, and it must be true sooner or later) **AND** ϕ is true in all states until that.
5. R : releases $\phi R\psi$ is true iff for all states following this ψ is true forever **OR** ϕ is true. ϕ authorize ψ to not hold, phi

$\models$ means models note that we are focusing on a particular state to model the future.
We can say that something holds in a path **if** it holds in all possible initial state.
for every path π of the Kripke structure M

$$\pi \models \phi$$

N.B.

$$M \not\models \phi \not\Rightarrow M \models \neg\phi$$

we can see the example in the slides for this.

slides 44 **FONDAMENTAL!**

if we say something in an infinite path we break it in now and which property i have to satisfie the next step.

$M \models T_1 R \neg C_1$ either c1 is always false or in order for c1 to become true t1 has to become true. t1 authorize c1

2 CTL

We work on the branching model of time