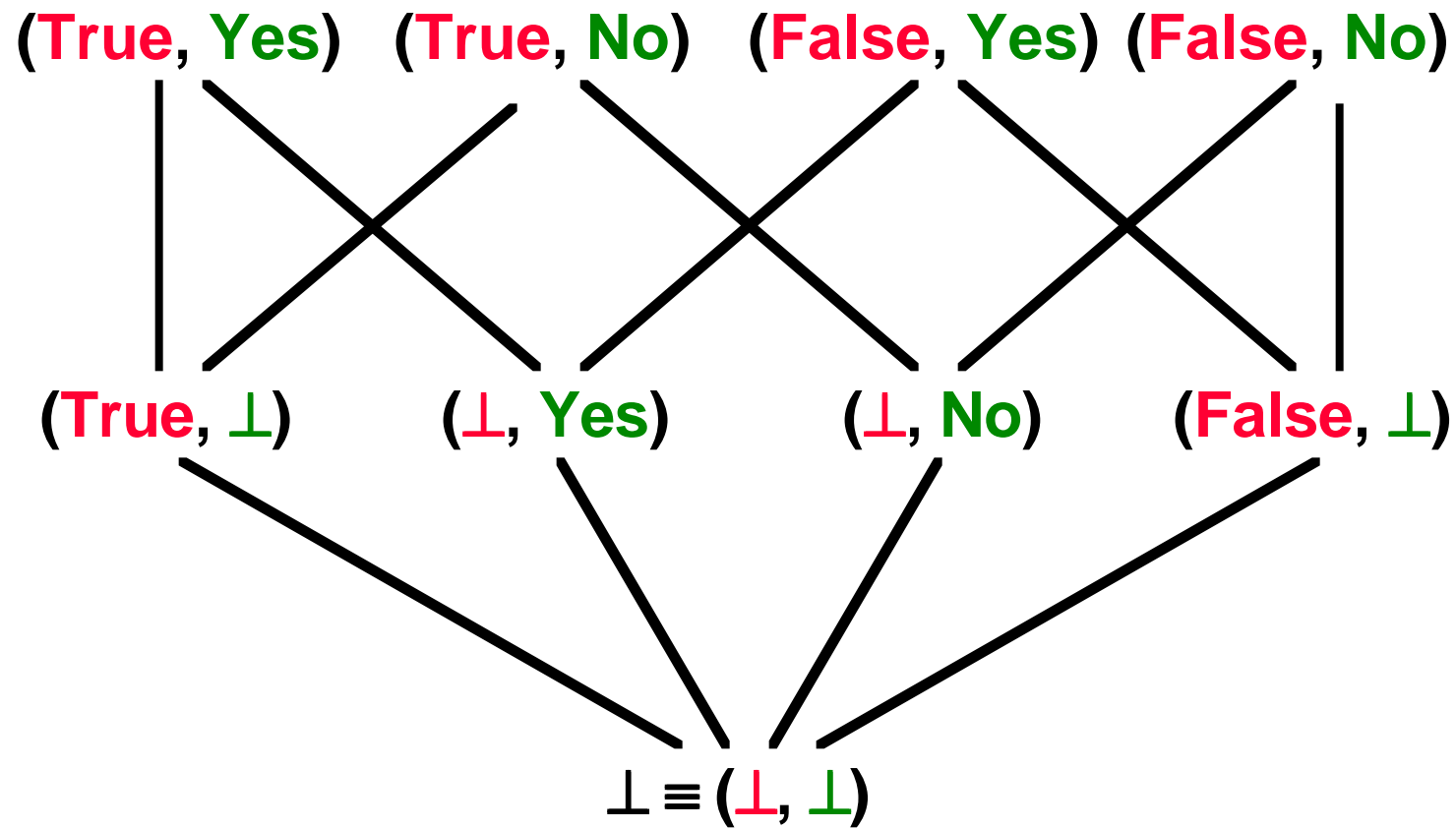


The partially ordered sets **Bool** and **Truth**.

`data Bool = False | True`

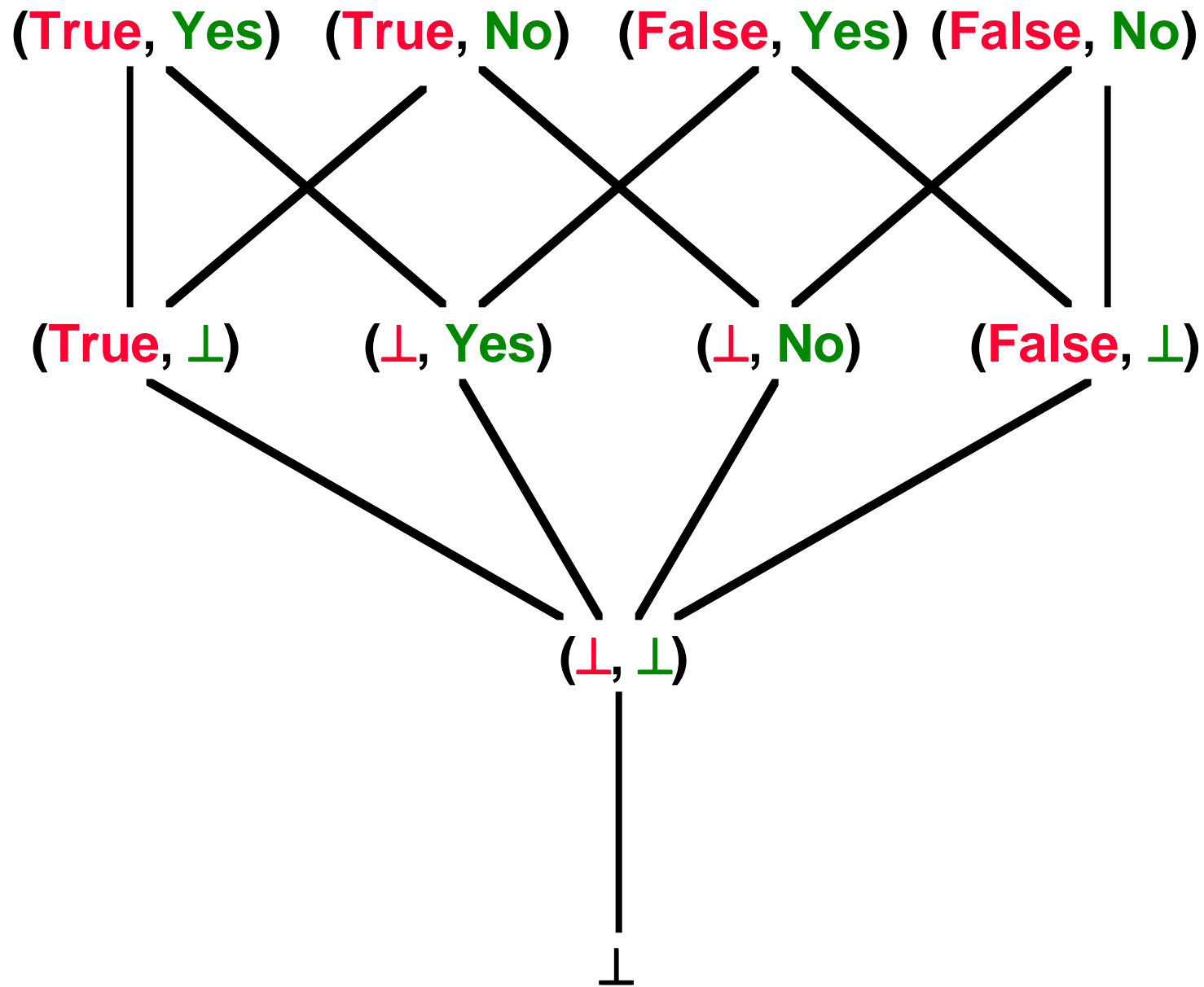
`data Truth = Yes | No`



The product of **Bool** and **Truth**.

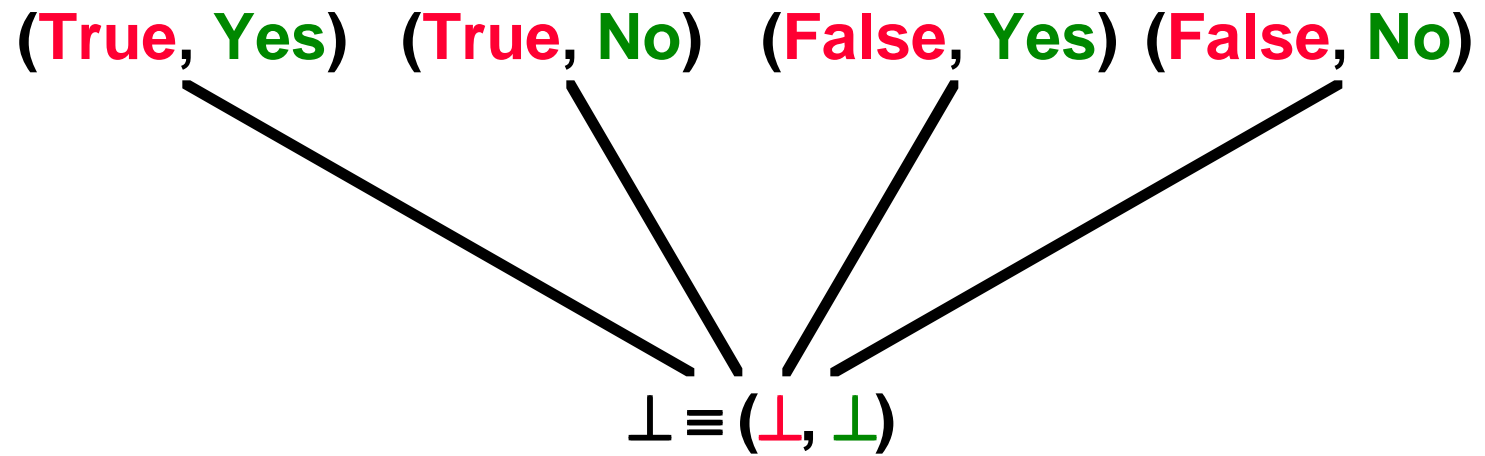
**Bool** × **Truth**

$$\perp_{\text{Bool} \times \text{Truth}} \equiv (\perp_{\text{Bool}}, \perp_{\text{Truth}})$$



The *lifted* product of  $\text{Bool}$  and  $\text{Truth}$ .

$(\text{Bool} \times \text{Truth})_{\perp}$



The ***smash*** product of Bool and Truth.

Bool  $\otimes$  Truth

True

False

Yes

No

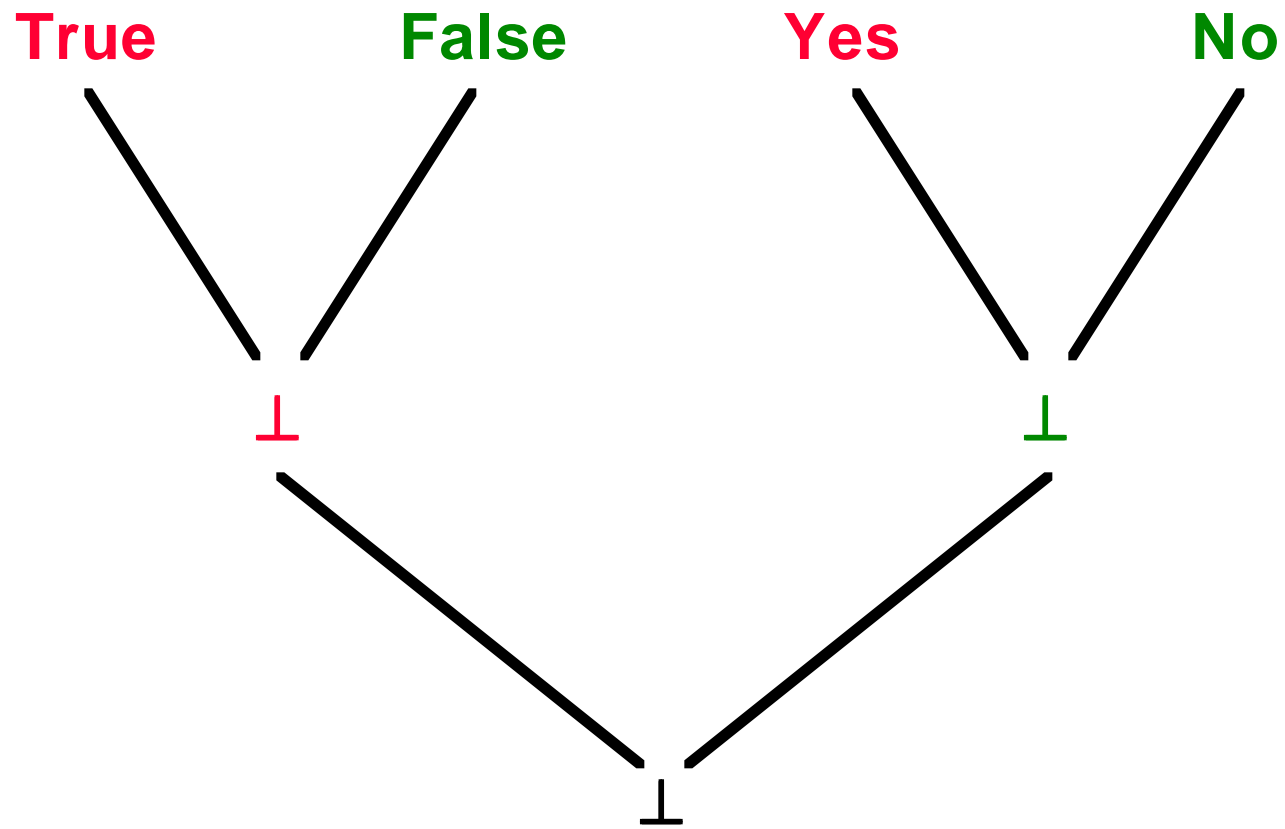
$\perp$

$\perp$

The sum of Bool and Truth.

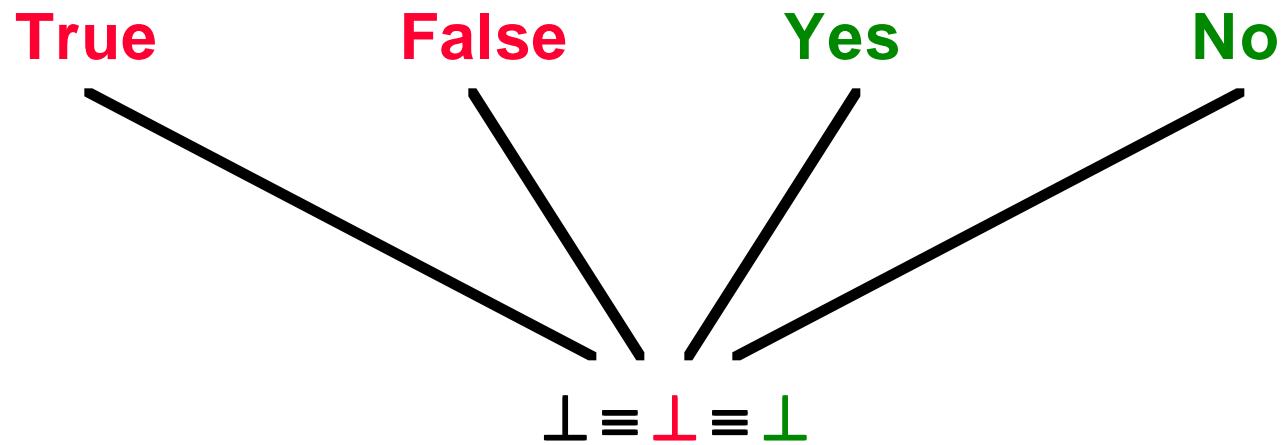
Bool + Truth (or  $\text{Bool} \cup \text{Truth}$ )

$\perp_{\text{Bool} + \text{Truth}}$  does not exist!



The ***separated*** sum of Bool and Truth.

Bool  $\langle + \rangle$  Truth



The ***coalesced*** sum of Bool and Truth.

Bool  $\oplus$  Truth