

**Definition** (Identity design problem). For any poset  $\mathbf{A}$ , the *identity design problem*  $\text{id}_{\mathbf{A}} : \mathbf{A} \rightarrow \mathbf{A}$  is a monotone map

$$\text{id}_{\mathbf{A}} : \mathbf{A}^{\text{op}} \times \mathbf{A} \rightarrow_{\text{Pos}} \mathbf{Bool},$$

$$\langle a_1^*, a_2 \rangle \mapsto a_1 \leq_{\mathbf{A}} a_2.$$