

Definition (Algebraic definition Monotone Co-Design Problems). An MCDP is a tuple $\langle \mathcal{A}, \mathbf{T}, \mathbf{v} \rangle$, where:

1. \mathcal{A} is any set of atoms, to be used as labels.
2. The term \mathbf{T} in the $\{\text{series}, \text{par}, \text{loop}\}$ algebra describes the structure of the graph:

$$\mathbf{T} \in \text{Terms}(\{\text{series}, \text{par}, \text{loop}\}, \mathcal{A}).$$

3. The *valuation* \mathbf{v} is a map $\mathbf{v} : \mathcal{A} \rightarrow \mathbf{DP}$ that assigns a DP to each atom.