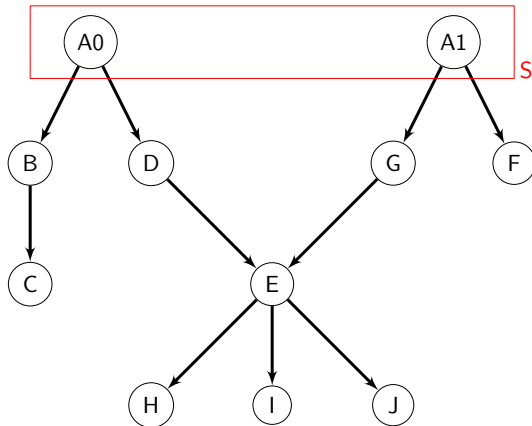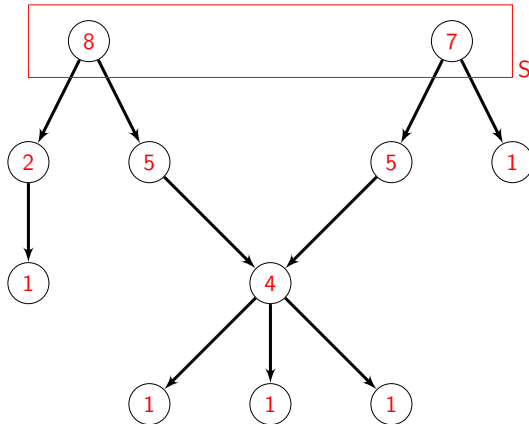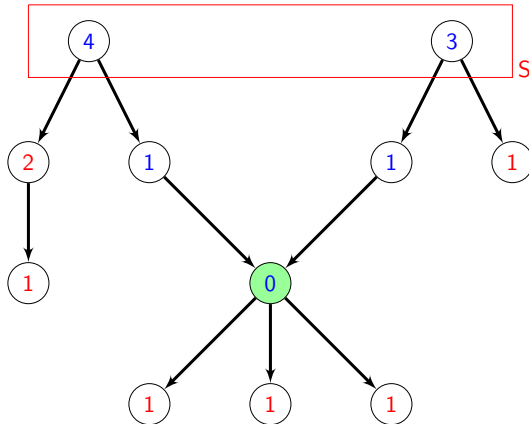# Spark Job Tree – Labels

Spark Job Tree – Operations per Node

Spark Job Tree – Caching E

Problem Formulation

$$\min \{ \sum_{i \in (S \subset V)} (c_i) : \mathbf{x} \in \mathcal{R} \cap \mathbb{B}^{|V|} \} \tag{1}$$

$$c_i = 1 + \sum_{j \in N_+(i)} (1 - x_j) \cdot c_j, \ \ \forall i \in V \tag{2}$$

$$\sum_{i \in V} x_i = k \tag{3}$$

$$0 \leq x_i \leq 1, \ \ \forall i \in V \tag{4}$$