Global Objective
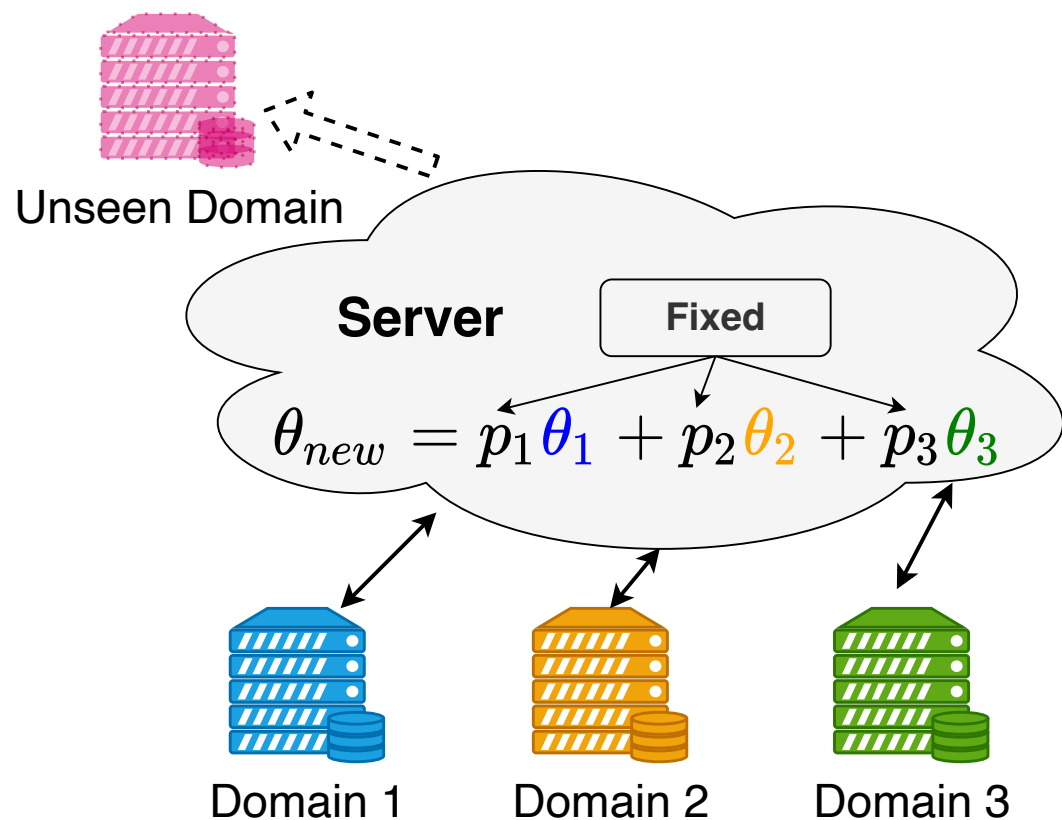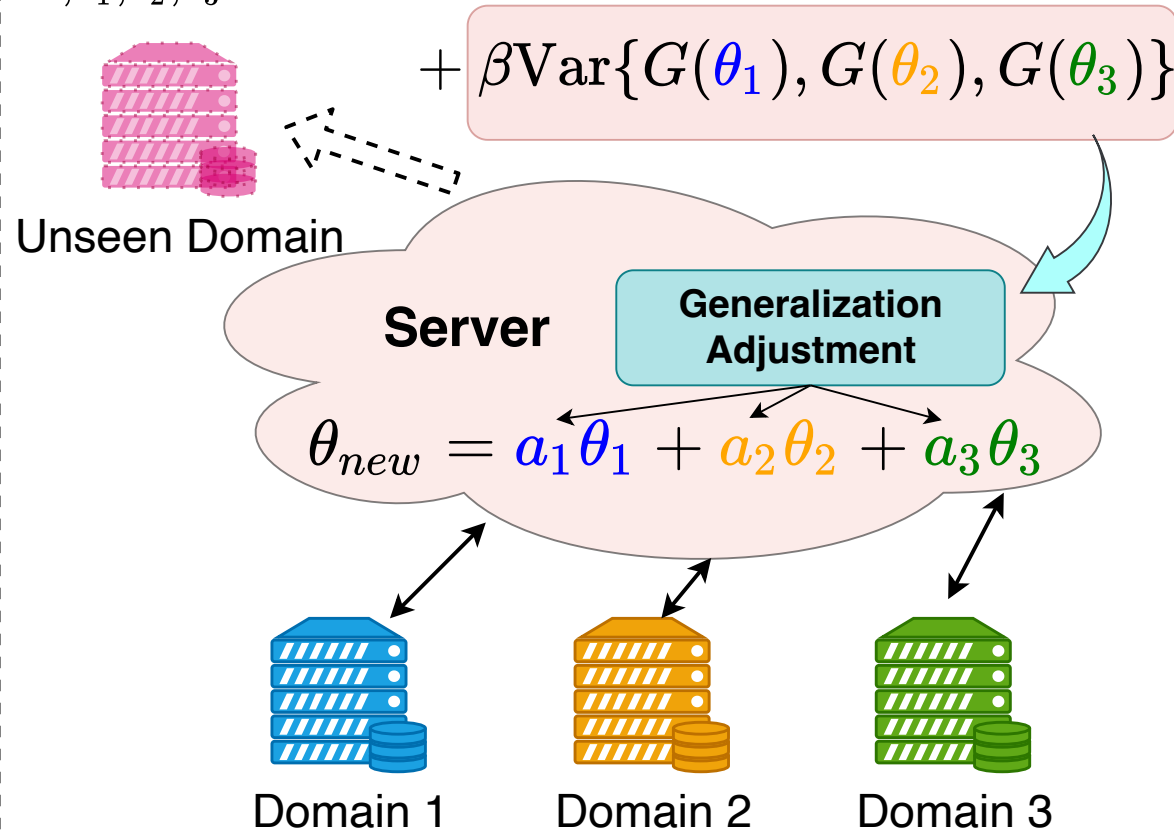
$$\min_{\theta} \mathcal{E}(\theta) = p_1 \mathcal{E}_1(\theta_1) + p_2 \mathcal{E}_2(\theta_2) + p_3 \mathcal{E}_3(\theta_3)$$

Unseen Domain

Server | Fixed |

$$\theta_{new} = p_1 \theta_1 + p_2 \theta_2 + p_3 \theta_3$$

Domain 1   Domain 2   Domain 3

(a) FedAvg

New Global Objective with Fairness Regularizer

$$\min_{\theta, a_1, a_2, a_3} \mathcal{E}(\theta) = a_1 \mathcal{E}_1(\theta_1) + a_2 \mathcal{E}_2(\theta_2) + a_3 \mathcal{E}_3(\theta_3)$$

$$+ \beta \mathrm{Var}\{G(\theta_1), G(\theta_2), G(\theta_3)\}$$

Unseen Domain

Server | Generalization Adjustment |

$$\theta_{new} = a_1 \theta_1 + a_2 \theta_2 + a_3 \theta_3$$

Domain 1   Domain 2   Domain 3

(b) Generalization Adjustment