

**CHENNAI – PONDICHERRY**

**Migration Modeling and Learning Algorithms for Containers in Fog Computing**

**Abstract**

Fog Computing (FC) is a flexible architecture to support distributed domain-specific applications with cloud-like quality of service. However, current FC still lacks the mobility support mechanism when facing many mobile users with diversified application quality requirements. Such mobility support mechanism can be critical such as in the industrial internet where human, products, and devices are moveable. To fill in such gaps, in this paper we propose novel container migration algorithms and architecture to support mobility tasks with various application requirements. Our algorithms are realized from three aspects: 1) We consider mobile application tasks can be hosted in a container of a corresponding fog node that can be migrated, taking the communication delay and computational power consumption into consideration; 2) We further model such container migration strategy as multiple dimensional Markov Decision Process (MDP) spaces. To effectively reduce the large MDP spaces, efficient deep reinforcement learning algorithms are devised to achieve fast decision-making and 3) We implement the model and algorithms as a container migration prototype system and test its feasibility and performance. Extensive experiments show that our strategy outperforms the existing baseline approaches 2.9%, 48.5% and 58.4% on average in terms of delay, power consumption, and migration cost, respectively.