National Institute of Technology Rourkela

Defence Seminar

Seminar Title	: Matching Theory based Efficient Task Offloading Strategies in IoT-Fog Networks
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Venue	: HOD Room, CSE Department
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Abstract	: Task offloading refers to executing tasks from resource-constrained IoT devices at the nearby fog nodes (FNs) in networks. Although offloading tasks to neighboring FNs provides multiple benefits to the users through improved response time, real-time mobility support, and location awareness, it has the following research challenges. Firstly, generating an offloading plan in polynomial time is highly challenging considering the complexity of the problem. Secondly, the offloading technique should be efficient, computationally inexpensive, and scalable. Finally, the limited computational resources of FNs, and strict requirements of real-time applications on maximum tolerable latency make the problem more challenging. In this regard, this thesis presents and discusses five different offloading strategies. The first three protocols, viz., A-DAFTO, M-DAFTO, and E-DAFTO are developed following max-min quota based Deferred Acceptance (DA) algorithm. A-DAFTO uses an additional quota called Artificial quota to provide a relatively non-cluster allocation. M-DAFTO aims to find a feasible task sequencing which boosts the performance of the multistage matching protocol for task offloading. E-DAFTO shows its superiority over M-DAFTO by relaxing the restriction of strict task sequencing and thereby utilizing the computational efficient FNs effectively to improve average offloading time. Although these protocols are efficient and could reduce average offloading delays and outages, each generates partially stable mapping and ignores energy consumption while making offloading decisions. Consequently, a DA based strongly stable task offloading model (DASTO) focusing only on maximum quotas at the FNs is proposed. DASTO realizes decreased average offloading latency, outages, and average offloading energy. Since these four proposed protocols are not applicable in environments with multiple service providers (SPs), a student project allocation based offloading model (SPASTO) is developed that provides a strongly stable matching plan and not only minimizes the average offloading delay, outages, and average offloading energy but also total user cost.