COORDINATION MECHANISMS FOR RESOURCE ALLOCATION IN FOG COMPUTING

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INTRODUCTION

- Fog computing extends cloud capabilities to the network edge, enabling low-latency services for IoT applications (e.g., smart cities, autonomous vehicles).
- However, fog resources are limited, heterogeneous, and shared among IoT devices.
- At the same time, fog nodes may fail, become overloaded, or join and leave unpredictably, especially in open, large-scale environments.
- Resource Allocation problem aims to assign fog resources to IoT tasks efficiently to minimize or maximize objectives

MOTIVATION

- Centralized resource management approaches are insufficient to handle these IoT-Fog limitations.
- Consequently, there is a need for decentralized solutions, such as Multi Agent System (MAS).
- Therefore, we focus on addressing resource allocation problem between IoT and Fog layers by integrating MAS with proposing an efficient coordination mechanism between IoT and Fog agents.

OBJECTIVE

- Developing a scalable MAS with an efficient coordination mechanism using Contract Net Protocol (CNP) that can handle conflicting objectives, adapt to dynamic environments, and operate in open networks with frequent topology changes.

TOWARDS A MULTI-AGENT APPROACH FOR FC

- Our optimization problem: how to dynamically allocate fog resources to IoT task requests in a large-scale, fair, and decentralized manner such that (1) no fog node is overloaded, (2) global social welfare is maximized
- Based on Ductor, S., & Guessoum, Z. (2018)., we propose two critical modifications for agents' decisions in the basic CNP:
- 1.Fog decision: "Can I make a proposal?" => Host Overload Prevention
- 2.IoT decision: "Which proposal should I accept?" => Social Choice Theory
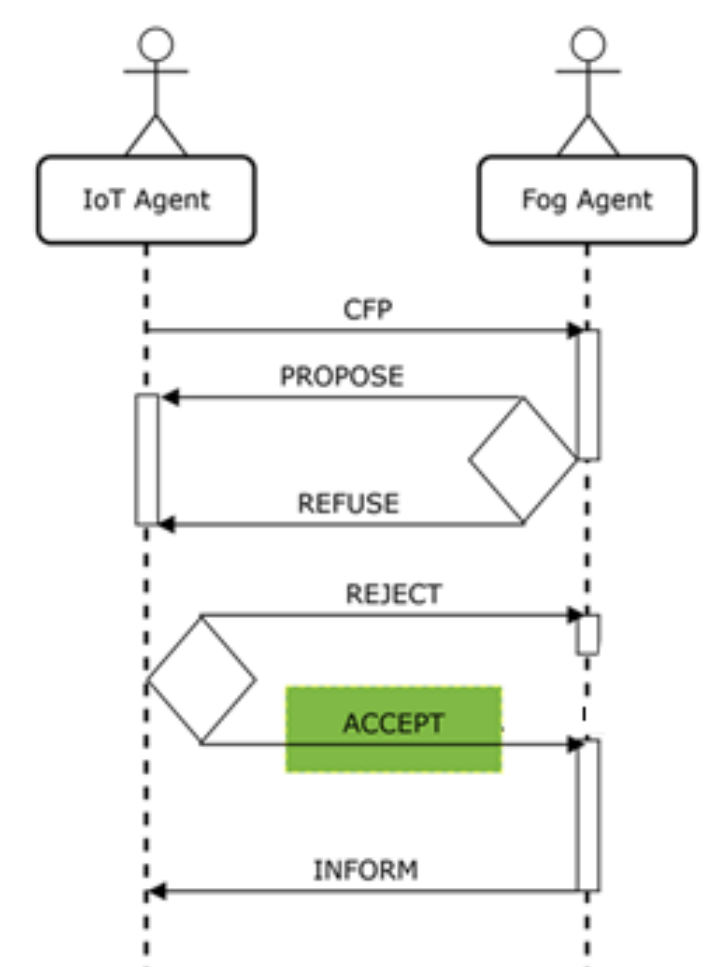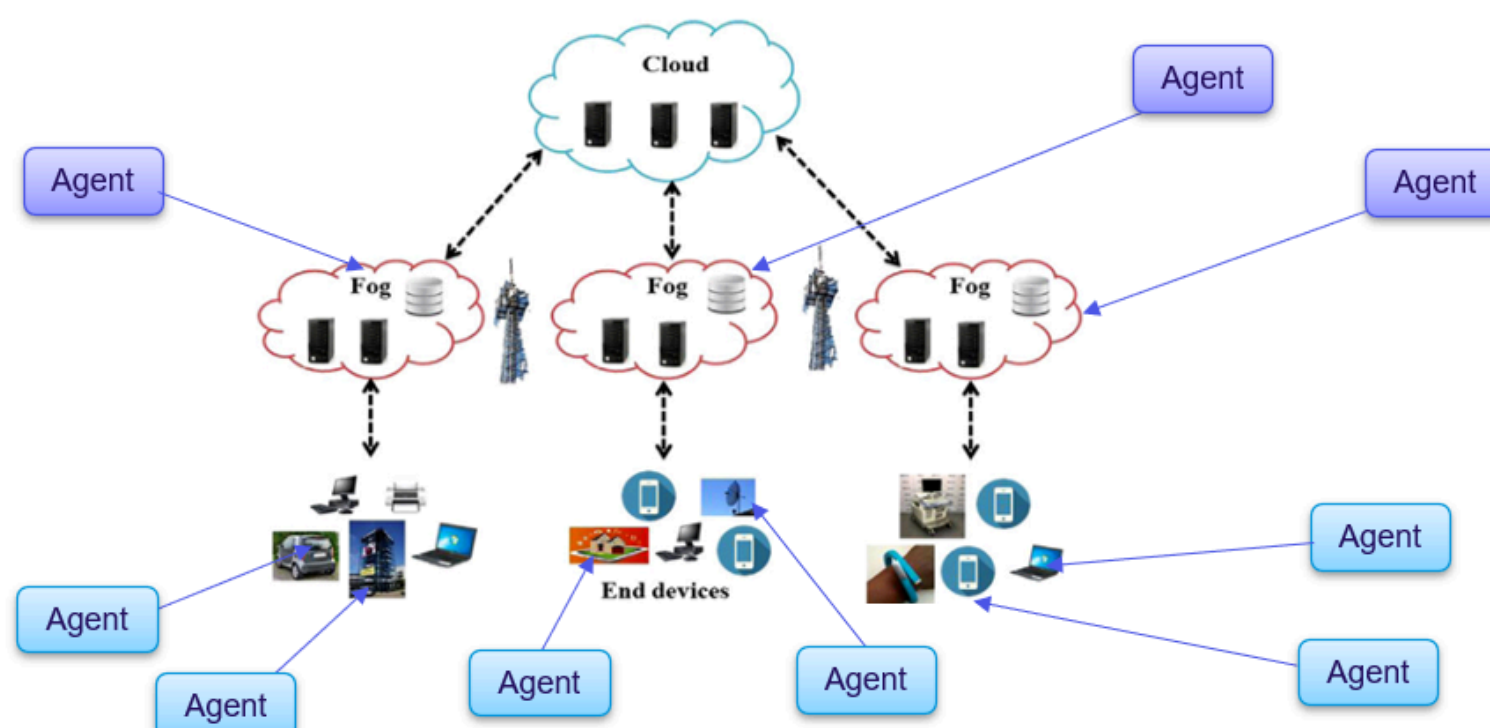
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