Microservice-Based Fog Testbed for 6G Applications

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Abstract— This paper provides a real-time fog computing model based on a microservice architecture that enables testing and modeling of eventual implementations of ultra-reliable low-latency communications (uRLLC) services. The work provides fog-based architecture for sixth-generation cellular (6G) applications, including telepresence and uRLLC. A testbed of a robot swarm was developed to prototype the proposed network architecture. Computing tasks are offloaded and handled based on a proposed microservice scheme introduced to meet the 6G requirements. Furthermore, we developed a novel migration scheme for the proposed architecture to support the mobility of end devices. The optimum server for migrating computing tasks is allocated by solving a proposed optimization problem using particle swarm optimization (PSO). All proposed algorithms were implemented in the developed prototype. The proposed work is introduced to provide an architectural foundation for testing fog-based 6G applications and services and to implement and test novel network methods in the future.

Keyword— fog computing, microservice architecture, 6G networks, telepresence services, uRRLC, Dobot Magician

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