LATENCY AWARE LOCATION BASED TASK OFFLOADING ALGORITHM IN EDGE AND CLOUD COMPUTING ENVIRONMENT

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Degree of Master of Science in Computer Science

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Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree Master of Science in Computer Science specialization in Cloud Computing.

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ABSTRACT

Performance-intensive applications are mainly introduced and used in the market after the evolution of 5G and IoT. Most of them still use cloud-based solutions, where only a portion of the application stays on the front end and the rest of the processing occurs in the cloud. Industries such as smart cities, smart homes, and smart grids have limitations in terms of the performance required to completely move on to cloud-based solutions for processing due to their datacenter locations, as distance gives higher latency and poor application performance. Edge computing is the technology to tackle the bottleneck raised by these performance-intensive applications. Due to the resource limitations of the devices at the edge servers, cloud computing is also required to avoid any resource constraints in the worst-case scenario where both cloud and edge computing resources could be collaboratively used. Also, end devices move very often, and their network characteristics change as their location changes. Finding the best task offloading approach based on the end-device location and finding the best possible node to offload the application task was the major objective of this thesis. Existing studies related to task offloading were reviewed and studied along with their existing algorithms used for mobile end-devices for task offloading using iFogSim2. For better performance of mobile end-device applications, a new algorithm was proposed by including a GeoHashing mechanism for faster processing and searching of locations. Then again, it was identified by the simulation that the proposed method completely utilizes the edge nodes first before offloading to the cloud, which gives better performance for the application modules. Also, it was identified that the performance of overall module placements took less time compared to other existing algorithms like random assignments and bottom-up approaches. With the results, it can be stated that the proposed latency-aware task offloading algorithm performs better than other existing algorithms and is a good fit for mobile end-devices, where it could leverage task offloading to the closest node for better performance of the application.

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