6. CONCLUSION AND FUTURE WORK

6.1 CONCLUSION

An increasing use of the smartphones propagates the numerous users to access the web and mobile applications in the ubiquitous environment. However, the limited processing capabilities of the mobile devices lack in executing the resource-intensive mobile applications on the smartphones. MCC aims at empowering the mobile users to access the abundant resources from the remote cloud server by seamless execution. However, MCC still meets several constraints on conserving device energy, improving user satisfaction, and increasing provider’s profit during the execution of the mobile applications. To overcome the above constraints, this dissertation focuses on the development of dynamic, energy-efficient MCC framework for mobile and mobile IoT-based real time applications. This research has presented three significant contributions on MCC framework, namely QoS-aware load balancing (QALBA), SLA-based optimization (MUTUAL-BENEIT), and adaptive workflow management (GAF-SMART) approaches in various mobile application models such as MAUI, ThinkAir, and Cloudlet architectures.

QALBA satisfies the mobile user requirements using MAUI mobile cloud architecture. This approach has suggested a novel task scheduling and resource allocation techniques using computation offloading, task prioritization, task selection, task grouping, and Pareto principle to achieve load balancing in heterogeneous MCC environment. Moreover, this scheme modifies the resource selection both in local and offloadable remote execution of mobile applications. Therefore, the proposed approach achieves multi-objectives such as reduction in makespan, mobile device energy saving, balancing the load of PM resources, and avoiding VM migration in a dynamic mobile cloud environment. This approach outperforms the existing EAPA algorithm by reducing the makespan to 5.7%.

MUTUAL-BENEFIT approach targets on improving both the end user satisfaction and service provider’s profit. This approach aims to achieve the
optimal task offloading, task scheduling, resource allocation, and provider selection to maintain a proper trade-off between SLA objectives and profit of the provider. Executing non-recursive dynamic programming on ACO technique using ThinkAir architecture considers SLA objective functions while selecting cloud resources. Thus, the proposed approach executes the tasks in parallel, and reduces the time complexity and energy consumption of the mobile devices. The Bellman’s optimality principle allocates the best VM resources to the corresponding tasks based on resource utilization and resource cost with a higher satisfaction level of end user. The proposed approach also considers provider selection scheme to balance the load of the service provider and to ensure the highest profit of the provider. The experimental results of MUTUAL-BENEFIT model significantly achieve the benefits of enhancing profit of the provider by 11% higher and improving better performance in terms of mobile device energy saving by 10% and response time by 12% than the baseline NTGO approach.

The GAF-SMART approach is to develop the mobile cloud IoT paradigm for executing the real-time IoT-based mobile applications with the support of Cloudlet architecture. This approach focuses on the workflow of an application and adaptive application execution while ensuring a minimum level of energy consumption both in the device and the remote server by exploiting the adaptive task scheduler. It applies the gaming model-based fuzzy logic on the two stages such as the identification of succeeding tasks from various data streams and the execution of IoT adaptive applications in a hierarchical manner. Furthermore, the mobile cloud IoT paradigm is capable of automatically defining the allocation of hierarchically scheduled tasks based on the non-dominance execution to minimize the makespan and enhances the resource utilization, resulting in an energy-efficient system. The experimental results of the GAF-SMART outperform the existing mobile cloud IoT system of NG-MCIoT by accomplishing QoS in terms of makespan by 17.86%.
6.2 FUTURE WORK

MCC has become an emerging technology over the mobile and cloud computing technologies. To further enhance the performance of the proposed energy-efficient MCC framework, this work can be enhanced on mobile networking. MCC can provide the services to the numerous mobile users at the same time. However, it causes discomfort to mobile networks while providing the services to mobile application processing. Hence, the future attention of the research can be aimed at processing the mobile applications on a remote server while ensuring the context-aware execution even in the increase of the congestion rate in mobile networks.