CHAPTER V

CONCLUSION

In this thesis, two energy saving algorithms for task assignment in distributed system are proposed. The study case 1 presented in the first part of the thesis focuses on the proposed Energy-Efficient Process Clustering Assignment algorithm or EPC algorithm which aims to minimize the energy consumption on each processing unit during process execution, system idling, and data transmission. The EPC algorithm contains four sub-algorithms. The first sub-algorithm is used to cluster tasks into group, the second sub-algorithm to assign suitable processing units to the tasks, the third sub-algorithm to schedule the tasks, and the last sub-algorithm to reduce the idle time in each processing unit. The total energy consumption from the EPC algorithm was compared to those from HEFT and LSH algorithm. The results show that EPC algorithm is able to perform under the lowest energy consumption. This is most likely due to the clustering and processing unit assignment performed prior to the task scheduling. Although the minimum energy consumption can be achieved using EPC algorithm, the system finish time and limitation to the battery supply are not investigated in this study case.

In the second part of thesis, the energy-sufficiency level assignment (ESL) algorithm was proposed to address the issues of energy consumption, system finish time, and battery supply limitation. The performance of ESL algorithm in terms of energy consumption and system finish time are compared with those from HEFT, PET, Lookahead, CEFT, and PEFT algorithms. The comparisons were made in six experimental cases and the results showed that ESL algorithm yielded the shortest system finish time in most cases and the lowest total energy consumption in all cases. The performance of the ESL algorithm is most likely attributed by scheduling algorithm which is performed one level at a time. This lowers the time complexity of the scheduling and ultimately the total energy consumption and system finish time. The battery limitation constraint was demonstrated in the last experimental case

that the ESL algorithm was able to perform under this limitation till reaching the threshold at 250 units.

It is worth mentioning that the performance of ESL algorithm strongly depends on initial estimations of various parameters such as processing units and the dependent task graphs. Future improvement to this work could be made by introducing an algorithm which can equally distribute the work load between all processing units. This way the resource will be more efficiently utilized and energy consumption can be further reduced. Due to performance consideration of the proposed algorithms that excludes parametric information about energy consumption estimation, cost of the dependent task graph, busy server handling, and expired schedule, future effort to incorporate these issues should be emphasized.