ABSTRACT

Power-performance tradeoff is a critical issue in the heterogeneous multiprocessor system, especially, in the modern mobile computers with large number of cores. Task scheduling in heterogeneous multiprocessor systems is defined as NP-complete problem. Which means the optimum power and execution time could not be achieved using some known algorithm in polynomial time. A heterogeneous multiprocessor system needs a complex algorithm to achieve a sub-optimal power and performance when executing a given application.

In this thesis we introduce a powerful methodology for exploring the valid combinations of heterogeneous processors in multi processors platforms with large number of processors to execute a given application with the purpose of achieving the suitable power-performance tradeoff. Our methodology employs the genetic algorithms (GAs) to explore the search space of valid combinations of the processors to execute the problem.

The experimental results show that our objectives regarding the performance-power enhancement are achieved. Moreover, we succeed in estimating the time and power needed to execute a big problem among high scale processors in offline mode. Accordingly, the suitable processors configuration is set to achieve the maximum performance within the consuming power constraint by using GA.