ABSTRACT

Traveling Salesman Problem well known as an important issue combinatorial optimization. The goal is to find the shortest path from an initial city to the destination city that each city can only be passed exactly once and then back into town early. Methods to solve TSP one of which is a Genetic Algorithm (GA). GA is a method that can produce a solution and the optimal time. Although GA is the optimal method and a good approach for TSP but when the number of cities in the TSP increased the time required will be greater. This is because the calculation of fitness value of each generation will be more and more every city number increases. Therefore, it will be created a system to deal with the issue parallelize GA method. The system will run on Microsoft - MPI using Parallel Genetic Algorithm to produce optimal time complexity.

This research uses Parallel Genetic Algorithm method with MPI to be applied to a case study TSP to 101 cities. This method is a system to deal with the problem of time in the GA when the number of cities in the TSP increased in a way parallels the fitness calculation process using the Send and Recv MPI functions to be performed on the slave node. For the initialization process, crossover, mutation and elitism performed on the master node. This method is able to work optimally when the number of population increases, where the value of a constant probability of crossover and mutation in each generation.

Observation results show that the performance is better than the Parallel Serial AG AG. Parallel AG on the TSP produce the shortest distance value at 4697.18 and the fitness value of 0.000213 for the use of 100 generations, the population size of 100, crossover probability mutation probability 0.9 and 0.1 with the required time of 1.67 seconds. While Serial AG on the TSP produce the shortest distance value at 4801.91 and the fitness value of 0.000208 for the use of 100 generations, the population size of 100, crossover probability and mutation probability, 0.9 and 0.1 with the timing 5.04 seconds.

Keywords : *Traveling Salesman Problem, Genetic Algorithm, MPI Cluster*.