This thesis proposes a two-stage optimization for solving unit commitment. In the first stage, Lagrangian Relaxation (LR) method is used to solve unit commitment using a sub-gradient algorithm for updating Lagrange multipliers. In the second stage, Particle Swarm Optimization (PSO) is applied to update Lagrange multipliers in the Lagrangian Relaxation method (PSO-LR). Lagrange multipliers solution obtained from the first stage is used as an initial solution for the PSO-LR in the second stage. The high quality initial Lagrange multipliers solution can improve the solution quality and the convergence rate. To intensify the Lagrange multipliers search, PSO uses a reduced search space in the neighborhood of the high quality initial solution. The PSO algorithm is applied to iteratively update Lagrange multipliers until optimal generating schedule is obtained. In addition, a heuristic-search based algorithm by unit decommitment uses to de-commit excessive spinning reserve units. The economic dispatch is solved by using a lambda-iteration method. The proposed method is tested on systems ranging from 10 to 100 units. The total production costs from the proposed method are less than LR, GA, MA, LRMA, PSO and GAUC. EPL and EMO-ALHN, especially for larger system size, leading to cost savings.