ANT COLONY OPTIMIZATION FOR UNIT COMMITMENT PROBLEM

BY
NOOR ELYLIANA BT ABU TALIB

A THESIS SUBMITTED FOR BACHELOR OF
ELECTRICAL ENGINEERING (HONS)
AT THE UNIVERSITI TEKNOLOGI MARA (UiTM)

FACULTY OF
ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA

MAY 2010

ACKNOWLEDGEMENT

In the name of Allah, the Most Beneficent and Merciful, with the deepest gratefulness to Allah who has given me the strength and ability to complete this thesis.

First and the foremost, I would like to express my gratitude and most sincere appreciation towards my project supervisor, Assoc. Prof Bibi Norasiqin bt Sheikh Rahimullah for her kind guidance, criticism, advices and support in complete this project.

My gratitude also goes to my beloved family member especially my mother, Kamsinah bt Mahat for advices, prayers, encouragement and continuous moral support for the completition of my study in Universiti Teknologi MARA.

Special thanks to Khairil, Khairol Basha and Melor Md. Hodari for their valuable ideas and finding references during this project developement

Last but not least, thank you to my lecturer, friends and supporting staff's who have involved directly and indirectly in helping me to complete this thesis. The support and encouragement from all the people wills always be a pleasant memory throughout of my life.

Thank you very much and may Allah bless you always.

Noor Elyliana bt Abu Talib

Bachelor in Electrical Engineering (Hons.)

Faculty of Electrical Engineering

Universiti Teknologi MARA

Shah Alam, Malaysia

ABSTRACT

The unit commitment problem is defined as the scheduling of a set of generating units to be on or off to meet the demand. For a power system operated by a vertically integrated monopoly, committing units is performed centrally by the utility, and the objective is to minimize the costs while supplying all demand. In this paper, ant colony optimization (ACO) is proposed to solve unit commitment problem in power system. The ACO is a cooperative agents approach which inspired by behavior of real ant of finding the shortest path from food sources without using visual clues. These cooperating agents will cooperate to find good solutions for unit commitment. In order to fulfill the demand the related constraints is consider. The proposed approach is expected to yield minimized operational cost while supplying the load from the operated generation units. This approach is tested on 6 generation units test system over 4 stages of 24 hours period. The schedule is successfully obtained for the test system.

Keywords; Unit commitment, Ant Colony Optimization.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

A great problem developed from the industrial era is the dilemma of the increasing demands for energy. As the electric power industry assumes an ever increasing commitment to resolve the energy supply problem, it is subjected to escalating societal pressure to:

i. Generate reliably a sufficient amount of electricity to meet any demands.
ii. Retain or decrease its price rates.
iii. Minimize the impact of its generation efforts upon the ecosphere.

Therefore, unit commitment is one of the pertinent analyses required in the scheduling and dispatch of the power system. It is the process of deciding in advance whether to turn on or off each generator on the power grid at a given hour. It becomes an intricate mathematical decision process because the hourly decisions are interdependent. Various mathematical techniques have been developed to cater for the requirements of solving the unit commitment problems in power system [1].

Many utilities have daily load patterns which exhibit extreme variation between peak and off-peak hours because people use less electricity on Saturday than on weekdays, less on Sundays than on Saturdays, and at a lower rate between midnight and early morning than during day. If sufficient generation to meet the peak is kept on line throughout the day, it is possible that some of the units will be operating near their minimum generating limit during the off-peak period. The problem confronting the system operator is to determine which units should be taken offline and for how long.