

# CHAPTER I

## INTRODUCTION

### 1.1. Background

Crossword is a puzzle word game. The puzzle consists of boxes and clues. In this puzzle the player have to answer or solve the clues given and insert the answer of the clues into the corresponding boxes. Each of the word/answer will crossing (intersect) another word. The puzzle will be solved if all of the boxes filled by the letter.

This puzzle game can be used in a learning process. Especially for reviewing the lessons. Unfortunately this method of learning can consume more time to make the puzzle. Because each words have to be arranged to intersect to another word. So if there are more words / answer in the puzzle, there will be more words to be placed in the puzzle. The puzzle need to be check whether there is a placed that can be intersected each time there is a word need to be placed.

Parallel genetic algorithm will be used to overcome this problem. Genetic algorithm is an algorithm that inspired by the process of natural selection in evolution. The main idea in this algorithm are selection, crossover, mutation. In the selection, chromosome that have higher fitness value will be selected to survived to the next generation and will be used for the crossover step. In the crossover, the chromosome that survived from the selection will be crossed over by another chromosome to make a new chromosome. And in the mutation part, the chromosome that produced and survived will have a certain percentage of mutation. When a chromosome mutate, its gen changes. This process can help achieving more optimal solution. Because there is a chance that generated population doesn't have the solution for the problem. While parallel here

means using a multi threading. Multithreading is a method that can make a program run more than one process in a parallel. It mean that another process can run without waiting the first process to finished it task.

Java programming language will be used in this program. Thread from java will be used to divide a process into smaller process and run those processes simultaneously. This method can generate crossword faster. For the data structure this program will use array to store the chromosome and use hash table to store vertical and horizontal words.

### **1.2. Scope**

This project will discuss how to generate the crossword using genetic algorithm. Including how to find the fitness values and make sure that each word in the generated crossword will intersect with another word. This project will using multithreading in some processes. These processes will be created as a thread then the program will run the thread parallel.

### **1.3. Objective**

The goal of this program is to create a crossword puzzle based on the set of words and clues that user input. To make experiment the algorithm with ease, the user will be able to change some attribute that needed in Genetic algorithm. The attribute that can be change such as number of individual in a population and chance of mutation.

## **CHAPTER II LITERATURE STUDY**