HACETTEPE UNIVERSITY

COMPUTER ENGINEERING DEPARTMENT

BBM 342 – Operating Systems

Experiment 2

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Introduction

The objective of the experiment is to learn the basics of processes and threads on UNIX environment.

In this experiment, a parallel file search system was developed using POSIX Threads, mutexes (with semaphores) and, pipes.

Solution

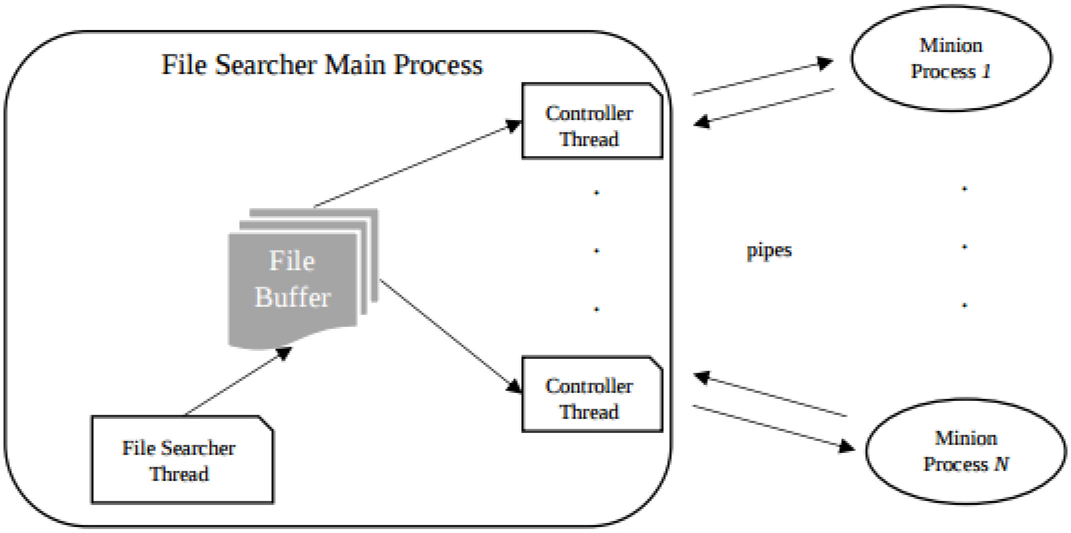

Figure 1: *General schema of the parallel file search system.*

The main process creates shared sources (buffer, search log file), minion process, controller threads, and, pipes between controller threads and minions. Also, the main process creates a single file searcher thread.

The file searcher thread finds all "txt files" in given path and puts these files to the buffer. Also, the file searcher thread puts "NULL" as many as minions (or controller threads) at the end of the search operation. The purpose of putting "NULL"s is to inform controller threads that there are no other files.

The controller threads read a file and send it to the associated minion process using the pipe. Also, they read results that the minion processes send and write them to the "search log file". And the control threads do this operation until read a "NULL".

The minion processes search a string in a file that the controller thread sent. They write the results in a text file and also, send them to the controller thread through the pipe.

The main parts of the system are mentioned the above. Other critical decisions are the following:

- To manage the buffer, common producer & consumer problem solution was used: two counting semaphores and one binary semaphore(mutex).
- To communicate with the minion process, the pipes were used with interchanging “stdin” and “stdout”.