ECEC 353: Systems Programming
Programming Assignment 1

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This assignment is due February 12, 2015.

You have been provided with a single-threaded program called `minigrep` that takes two inputs: (1) a search string `string` and (2) a path name within the file system `path`. The usage information for `minigrep` looks like this:

```
$ ./minigrep
Usage:  ./minigrep mode path string

       mode     -      either -S for single thread or -P for pthreads
       path     -      recursively scan all files in this path and report
                         all occurances of string
       string   -      scan files for this string
```

`minigrep` searches the files and directories that appear under `path` for the specified string. When a directory is encountered, `minigrep` searches all files (and sub-directories) under this directory recursively.

For example:

```
$ ./minigrep -S . shack
```

searches the file system starting from current directory (indicated by the single dot `.`) for the string `shack`. File are searched line-by-line. When a line within a file containing the string `shack` is encountered, `minigrep` reports the file containing the string, the line number in the file at which the string `shack` was found, and the line of text itself that contained the string `shack`. Once the `minigrep` has scanned all files under the specified `path`, it reports the total number of occurrences of the string `shack` and terminates.

This functionality is provided by `minigrep_simple()` in `minigrep.c`. Your assignment is to develop the `minigrep_pthreads()` function, which implements a multi-threaded search using `pthreads`. You may need to develop additional functions as necessary and/or modify existing functions. In short, I want the `-P` mode flag to work.

Upload your modified minigrep.c to Black Board Learn. Your submission should build using:

```
$ gcc -o minigrep minigrep.c -lpthread
```

Also, upload a report in **PDF format** describing:

1. The design of your multi-threaded program (use code or pseudocode to clarify the discussion).
2. The speedup achieved over the serial version for 2, 4, 8, and 16 threads when searching for the string `Hartman` starting from the path `/home/DREXEL/jas64/linux-next`

Limit the length of your report to five pages.