COSC 3360 - Fundamentals of Operating Systems

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Description　　　Submission view

Programming Assignment 1

Due date: Friday, 24 June 2022, 11:59 PM
Requested files: main.cpp (Download)
Type of work: Individual work

Similarity Threshold: 95%

Problem:

For this assignment, you will create a multithreaded solution to search for multiple patterns in a given text using the Rabin–Karp algorithm (https://en.wikipedia.org/wiki/Rabin–Karp_algorithm).

The brute-force string matching solution requires comparing the given pattern against all positions in the given text. Given *m* as the size of the pattern and *n* as the size of the text, the worst-case time for this method is proportional to the product of *m* * *n*.

The Rabin–Karp algorithm reduces the worst-case time by using a hash function to perform a quick approximate check for each position and then performing an exact comparison at the positions that pass this approximate check.

Given the ASCII alphabet (256 characters), you need to implement a string matching solution to search for multiple patterns based on the following steps:

- Read the input from STDIN (the Moodle server will implement input redirection to send the information from a file to STDIN). The format of the input file is as follows:

  - A string representing the text

  - An integer representing the number of patterns.

  - n lines (where n is the number of patterns) with a string representing a pattern.

  Given the previous format, the following file represents a valid input file:

  ```
  Carlos Alberto Rincon Castro
  4
  Ca
  o
  Rincon
  w
  ```

- Create n POSIX threads (where n is the number of patterns to find in the provided text). Each child thread executes the following tasks:

  - Receives the text and a pattern from the main thread.

  - Implements the Rabin–Karp algorithm to determine the positions where the pattern appears in the text (positions' values start from zero).

- Stores the positions (if the pattern was found) on a memory location accessible by the main thread.

- Print the result for the string-search process. Given the previous input, the expected output is:

```
SEARCH RESULTS:

Pattern "Ca" in the input text at position 0
Pattern "Ca" in the input text at position 22

Pattern "o" in the input text at position 4
Pattern "o" in the input text at position 13
Pattern "o" in the input text at position 19
Pattern "o" in the input text at position 27

Pattern "Rincon" in the input text at position 15

Pattern "w" not found
```

NOTES:

- Not using multiple POSIX threads to implement your solution will translate into a penalty of 100%.
- You must use the output statement format based on the example above.
- You can safely assume that the input will always be valid.

Requested files

main.cpp

```
// Write your program here
```

VPL

◄ Extra Credit Question - Fork

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