Operating Systems

Assignment 2

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Part I: Single Process Pattern Search

Introduction

Implement a basic pattern search in a file using a single process.

Objective

- Search for a pattern in a specified file range and report if found or not, displaying the process ID.

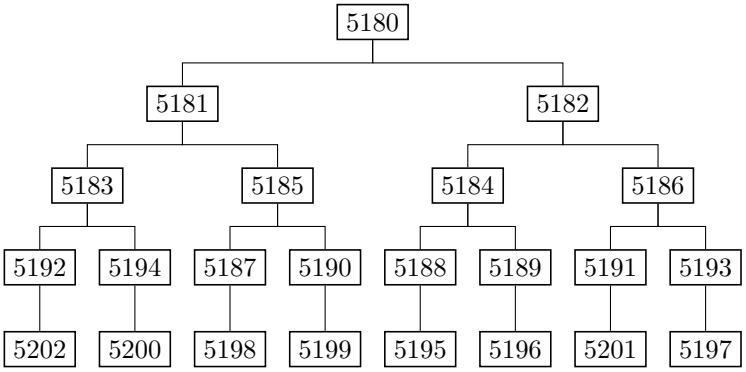
Part II: Multi-Process Pattern Search with Chunking

Introduction

Expand the search to multiple processes by dividing the file into chunks and searching each chunk concurrently.

Objective

- Implement a partitioner to spawn processes for chunks and manage recursive process creation. Ensure synchronization and output status updates.



Results of Part 2 in Terminal

```
    [5180] start position = 0 ; end position = 67108863
[5180] forked left child 5181
[5180] forked right child 5182
[5181] start position = 0 ; end position = 33554431
[5182] start position = 33554432 ; end position = 67108863
[5181] forked left child 5183
[5182] forked left child 5184
[5181] forked right child 5185
[5182] forked right child 5186
[5184] start position = 33554432 ; end position = 50331647
[5185] start position = 16777216 ; end position = 33554431
[5186] start position = 50331648 ; end position = 67108863
[5183] start position = 0 ; end position = 16777215
[5184] forked left child 5188
[5184] forked right child 5189
[5185] forked left child 5187
[5185] forked right child 5190
[5186] forked left child 5191
[5183] forked left child 5192
[5186] forked right child 5193
[5183] forked right child 5194
[5188] start position = 33554432 ; end position = 41943039
[5189] start position = 41943040 ; end position = 50331647
[5187] start position = 16777216 ; end position = 25165823
[5193] start position = 58720256 ; end position = 67108863
[5190] start position = 25165824 ; end position = 33554431
[5188] forked searcher child 5195
[5189] forked searcher child 5196
[5193] forked searcher child 5197
[5187] forked searcher child 5198
[5190] forked searcher child 5199
```

```
[5194] start position = 8388608 ; end position = 16777215
[5191] start position = 50331648 ; end position = 58720255
[5192] start position = 0 ; end position = 8388607
[5194] forked searcher child 5200
[5192] forked searcher child 5202
[5191] forked searcher child 5201
[5202] didn't find
[5201] didn't find
[5192] searcher child returned
[5191] searcher child returned
[5183] left child returned
[5186] left child returned
[5198] didn't find
[5200] didn't find
[5187] searcher child returned
[5185] left child returned
[5197] found at 64520807
[5194] searcher child returned
[5183] right child returned
[5181] left child returned
[5193] searcher child returned
[5186] right child returned
[5196] didn't find
[5189] searcher child returned
[5195] didn't find
[5188] searcher child returned
[5184] left child returned
[5184] right child returned
[5182] left child returned
[5182] right child returned
[5199] didn't find
[5190] searcher child returned
[5185] right child returned
[5181] right child returned
[5180] left child returned
[5180] right child returned
```

Part III: Efficient Search with Process Termination

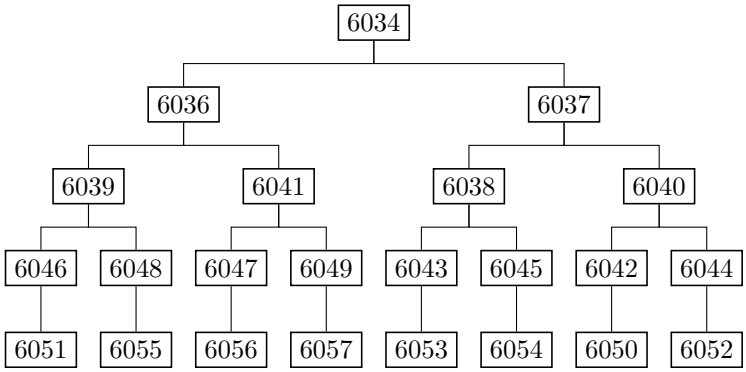
Introduction

Optimize the search by terminating all processes once a pattern is found, reducing redundant work.

Objective

- Implement signal handling to kill all other processes after finding the pattern, and ensure detailed status reporting.

Results of Part 3



Results of Part 3 in Terminal

```
[6034] start position = 0 ; end position = 67108863
[6034] forked left child 6036
[6034] forked right child 6037
[6036] start position = 0 ; end position = 33554431
[6037] start position = 33554432 ; end position = 67108863
[6037] forked left child 6038
[6036] forked left child 6039
[6037] forked right child 6040
[6036] forked right child 6041
[6038] start position = 33554432 ; end position = 50331647
[6040] start position = 50331648 ; end position = 67108863
[6039] start position = 0 ; end position = 16777215
[6041] start position = 16777216 ; end position = 33554431
[6040] forked left child 6042
[6040] forked right child 6044
[6038] forked left child 6043
[6038] forked right child 6045
[6039] forked left child 6046
[6041] forked left child 6047
[6039] forked right child 6048
[6041] forked right child 6049
[6042] start position = 50331648 ; end position = 58720255
[6044] start position = 58720256 ; end position = 67108863
[6046] start position = 0 ; end position = 8388607
```

```
[6045] start position = 41943040 ; end position = 50331647
[6043] start position = 33554432 ; end position = 41943039
[6042] forked searcher child 6050
[6048] start position = 8388608 ; end position = 16777215
[6047] start position = 16777216 ; end position = 25165823
[6049] start position = 25165824 ; end position = 33554431
[6044] forked searcher child 6052
[6046] forked searcher child 6051
[6043] forked searcher child 6053
[6045] forked searcher child 6054
[6048] forked searcher child 6055
[6047] forked searcher child 6056
[6049] forked searcher child 6057
[6052] found at 64520807
[6057] recieved SIGTERM
[6054] recieved SIGTERM
[6055] recieved SIGTERM
[6053] recieved SIGTERM
[6050] recieved SIGTERM
[6056] recieved SIGTERM
[6051] recieved SIGTERM
[6046] recieved SIGTERM
[6048] recieved SIGTERM
[6049] recieved SIGTERM
[6047] recieved SIGTERM
[6045] recieved SIGTERM
[6052] recieved SIGTERM
[6041] recieved SIGTERM
[6039] recieved SIGTERM
[6043] recieved SIGTERM
[6037] recieved SIGTERM
[6044] recieved SIGTERM
[6036] recieved SIGTERM
[6040] recieved SIGTERM
[6034] recieved SIGTERM
[6042] recieved SIGTERM
[6038] recieved SIGTERM
```