Assignment 1

Computação em Larga Escala

T1 - G8
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Problem 1 - Decomposition

countWords.c:

- Main and worker execution code

sharedMemory.c:

- Monitor implementation, operations sm_getChunkOfData and sm_registerResults executed in a mutual exclusion way.
- Additional operations: sm_initialize and sm_close to allocate and deallocate resources, sm_getResults to retrieve the final processing results.

utf8.c:

- Implementation of operations for processing UTF-8 characters: read UTF-8 character, determine UTF-8 character type and UTF-8 character size.

Threads

Main
```
{
  char** fileNames = parseFileNames();
  sm_initialize(fileNames);
  createWorkers();
  waitWorkers();
  Results res = sm_getResults();
  printResults(res);
  sm_close();
}
```

Worker
```
{
  forever
  {
    char data[SIZE];
    FileHandler handler;
    bool workToDo = sm_getChunkOfData(data, &fileHandler);
    if(!workToDo)
      break;

    Count count;
    processChunkOfData(&count);
    sm_registerResult(fileHanlder, &count);
  }
}
```

Problem 1 timing results

- The results were obtained by averaging 5 measurements (all 4 text files)

Buffer size: 4kB

1 worker:
time: 7 ms   standard deviation: 1.4 ms

2 worker:
time: 4.3 ms   standard deviation: 0.4 ms

4 worker:
time: 3.0 ms   standard deviation: 0.7 ms

8 worker:
time: 3 ms   standard deviation: 1.4 ms

Buffer size: 8kB

1 worker:
time: 6 ms   standard deviation: 1.3 ms

2 worker:
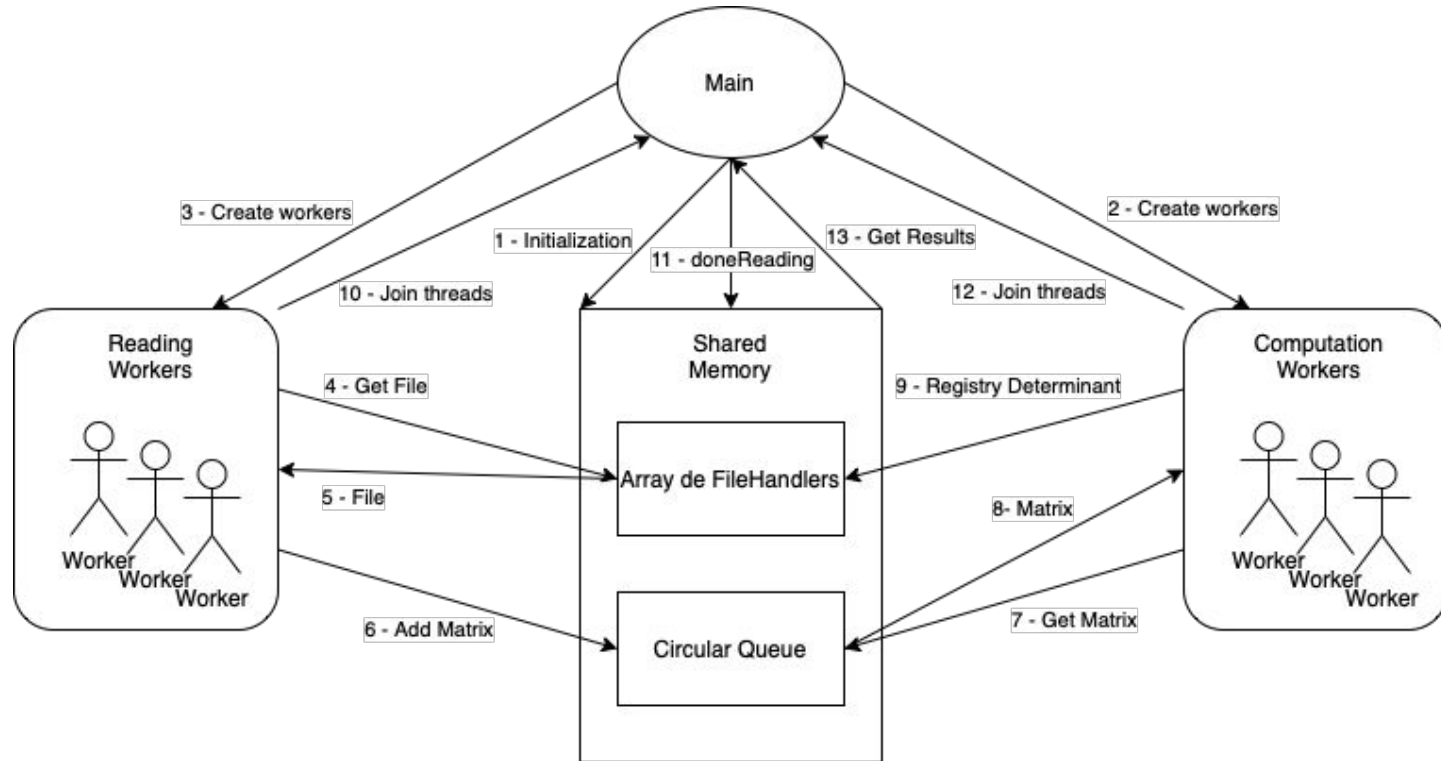time: 4 ms   standard deviation: 0.9 ms

4 worker:
time: 2.0 ms   standard deviation: 0.1 ms

8 worker:
time: 2.1 ms   standard deviation: 0.5 ms

Problem 2 - Decomposition

Threads

Read File Worker

```
{
  forever
  {
      continue = getFile(&fileHandler);
      if(!continue) break;
      file = open(fileHandler->fileName);
      fread(fileHandler->nMatrices, file);
      fread(fileHandler->order, file);
      for(int i=0;i<nMatrices;i++) {
              fread(fileHandler->matrix[i], file);
              putMatrix(fileHandler->matrix[i]);
      }
  }
}
```

Main

```
{
      fileNames = parseFileNames()
      initializeSharedMemory(fileNames);
      startComputingWorkers();
      startReadingWorkers();
      joinReadingWorkers();
      doneReading()
      joinComputingWorkers();
      print(getResults())
      freeMemory()
}
```

Determinant Worker

```
{
  forever
  {
      continue = getMatrix(&matrix);
      if(!continue) break;
      determinant = computeDeterminant(matrix);
      registerResult(matrix, determinant);
      // also frees the memory in the fifo
      corresponding with that matrix
  }
}
```

Problem 2 timing results

- The results were obtained by averaging 5 measurements

File: mat128_32.bin

1 worker:
time: 8 ms   standard deviation: 1.4 ms

2 worker:
time: 4.3 ms   standard deviation: 0.4 ms

4 worker:
time: 3.0 ms   standard deviation: 0.6 ms

8 worker:
time: 3 ms   standard deviation: 1.4 ms

File: mat512_256.bin

1 worker:
time: 8.99 s   standard deviation: 0.02 s

2 worker:
time: 4.57 s   standard deviation: 0.01 s

4 worker:
time: 2.45 s   standard deviation: 0.04 s

8 worker:
time: 2.08 s   standard deviation: 0.02 s