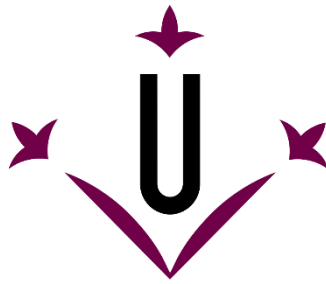


Sistemas concurrentes
Concurrencia MapReduce en Java



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Introducción

Esta práctica tiene como objetivo la implementación de una aplicación concurrente multihilo utilizando pthreads con el lenguaje de programación Java.

Para ello haremos uso de los recursos aprendidos en clase.

El equipo donde hemos ejecutado el programa para recopilar los distintos tiempos de ejecución tiene el siguiente hardware:

CPU: AMD Ryzen 5 2600 (6 nucleos 12 hilos con OC a 4,1GHz)

RAM: Corsair Vengeance 2x8GB (OC a 3466MHz)

Ejecución secuencial:

```
/usr/lib/jvm/jdk-17/bin/java -javaagent:/home/xavier/IntelliJ-IDEA/lib/idea_rt.jar=46617:/home/xavier/IntelliJ-IDEA/bin -Dfile.encoding=UTF-8
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/41-0.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/all.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/test1.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/pg5200.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/Beowulf.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/Quijote.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/74-0.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/pg42.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/pg20203.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/test12.txt.
Processing input file /home/xavier/Documents/University/Sistemas concurrents/P22021-PepoGine/Sequencial/./Test/16-0.txt.
Time elapsed during execution: 18652574993
Process finished with exit code 0
```

Ejecuciones concurrentes:

```
Thread number 4 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/Beowulf.txt
Thread number 1 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/all.txt
Thread number 7 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg42.txt
Thread number 5 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/Quijote.txt
Thread number 8 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg20203.txt
Thread number 10 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/16-0.txt
Thread number 9 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/test12.txt
Thread number 0 executing reduce phase
Program execution time: 14647139179
Process finished with exit code 0
```

```
Thread number 4 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/Beowulf.txt
Thread number 7 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg42.txt
Thread number 0 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/41-0.txt
Thread number 1 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/all.txt
Thread number 3 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg5200.txt
Thread number 5 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/Quijote.txt
Thread number 10 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/16-0.txt
Thread number 9 processing input file /home/xavier/Downloads/Concurrency_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/test12.txt
Thread number 0 executing reduce phase
Thread number 1 executing reduce phase
Program execution time: 14127945880
```

```
Thread number 3 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg5200.txt
Thread number 5 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/Quijote.txt
Thread number 1 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/all.txt
Thread number 7 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg42.txt
Thread number 8 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg20203.txt
Thread number 9 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/test12.txt
Thread number 10 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/16-0.txt

Thread number 1 executing reduce phase
Thread number 0 executing reduce phase
Thread number 2 executing reduce phase
Program execution time: 14282045747
```

```
Thread number 5 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/Quijote.txt
Thread number 0 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/41-0.txt
Thread number 4 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/Beowulf.txt
Thread number 8 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg20203.txt
Thread number 9 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/test12.txt
Thread number 10 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/16-0.txt

Thread number 3 executing reduce phase
Thread number 0 executing reduce phase
Thread number 4 executing reduce phase
Thread number 1 executing reduce phase
Thread number 2 executing reduce phase
Program execution time: 14441761151
```

```
Thread number 7 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg42.txt
Thread number 8 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/pg20203.txt
Thread number 9 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/test12.txt
Thread number 10 processing input file /home/xavier/Downloads/Concurrency\_MapReduce-597da8b84d240263f65a61e5819d90aa85f3614f/./Test/16-0.txt

Thread number 5 executing reduce phase
Thread number 6 executing reduce phase
Thread number 9 executing reduce phase
Thread number 3 executing reduce phase
Thread number 2 executing reduce phase
Thread number 1 executing reduce phase
Thread number 7 executing reduce phase
Thread number 0 executing reduce phase
Thread number 4 executing reduce phase
Thread number 8 executing reduce phase
Program execution time: 14541562109
```

Diferencia de tiempo entre ejecución secuencial y concurrente

Ejecución secuencial: 18,6525seg

Ejecución concurrente (1 red): 14,6471seg

Como se puede ver en los resultados de tiempo obtenidos con las distintas ejecuciones, la versión concurrente supone una mejora sobre la versión secuencial.

Mejora = $18,6525s / 14,6471s = 1,2734$ veces incremento de rendimiento

Diferencia de tiempo entre las ejecuciones concurrentes variando n_reducers

