

OpenMP

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False sharing

Computing π

```
double local_sum[NUM_THREADS];
#pragma omp parallel num_threads(NUM_THREADS) private(i, x_i)
{
    [...]
    for ( i = id; i < NUM_STEPS; i += nth ) {
        [...]
        local_sum[id] = [...];
    }
}
for ( i = 0; i < NUM_THREADS; i++ )
    sum += local_sum[ i ];
[...]
```

# threads	False Sharing	Reduction
1	1.97	1.97
2	2.88	0.98
4	3.54	0.49

False sharing

- Not all levels in the memory hierarchy are shared
- Some cache levels are private or shared among a subset of cores
- Cache line: basic unit of data movement between cache and main memory
- Cache coherence: aims at making the caches of a shared-memory system as functionally invisible as the caches of a single-core system
- Different threads writing to different entries of the same cache line: invalidation and re-read
- Increase of memory traffic. Decrease of performance. No scalability.