PAR Laboratory Assignment
Lab 1: Experimental setup and tools

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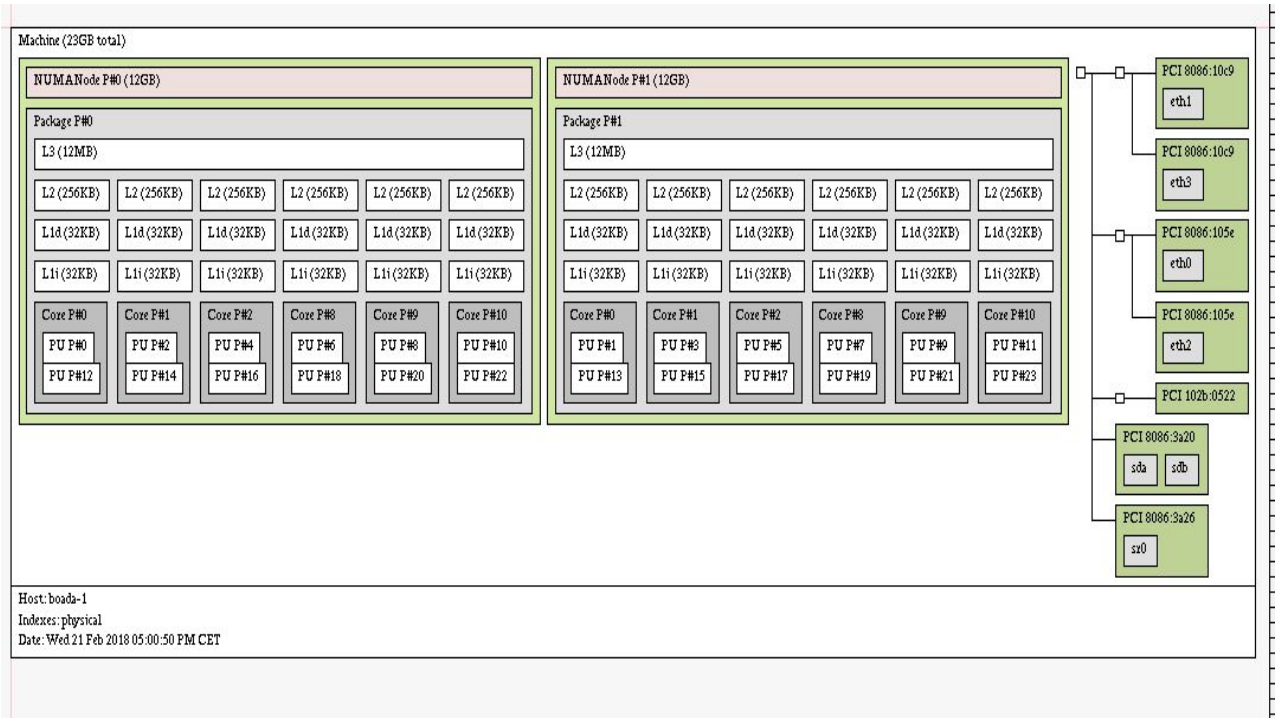
Grupo: 2312

1. Node architecture and memory

	boada-1 to boada-4	boada-5	boada-6 to boada-8
Number of sockets per node	2	2	2
Number of cores per socket per node	6	6	8
Number of threads per node	2	2	1
Maximum core frequency	2395	26000	1700
L1-I cache size (per-core)	32kB	32 kB	32 kB
L1-D cache size (per-core)	32 kB	32kB	32 kB
L2 cache size (per-core)	256 kB	256KB	256 kB
Last-level cache size (per-socket)	12288 kB	15360 kB	20480 kB
Main memory size (per socket)	12	31	16
Main memory size (per node)	24	62	16



2. Strong vs. weak scalability

Strong scalability is defined as how the solution time varies with the number of processors for a fixed total problem size.

Weak scalability, instead, is defined as how the solution time varies with the number of processors for a fixed problem size per processor.

Strong scalability

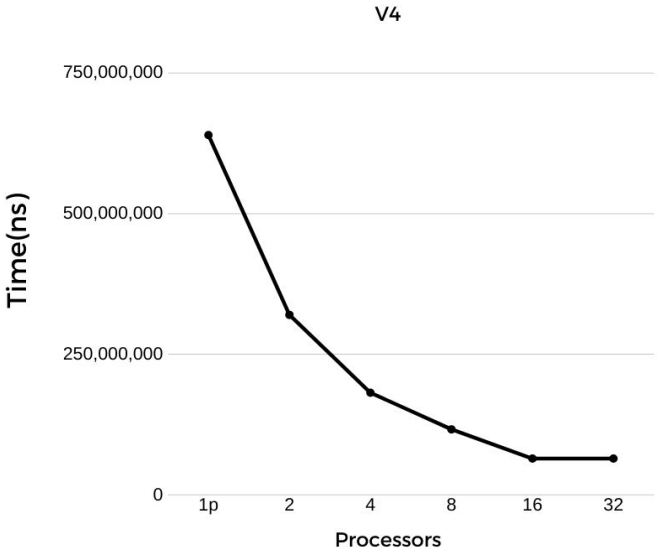
#threads	elapsed time	SpeedUp
1	3.94	1.00000000000000000000
2	1.98	1.98989898989898989898
3	1.33	2.96240601503759398496
4	1.00	3.94000000000000000000
5	0.84	4.69047619047619047619
6	0.70	5.62857142857142857142
7	0.60	6.56666666666666666666
8	0.54	7.29629629629629629629
9	0.49	8.04081632653061224489
10	0.45	8.75555555555555555555
11	0.47	8.38297872340425531914
12	0.42	9.38095238095238095238

Weak scalability

#threads	elapsed time	SpeedUp
1	0.40	1.00000000000000000000
2	0.40	1.00000000000000000000
3	0.41	.97560975609756097560
4	0.41	97560975609756097560
5	0.42	.95238095238095238095
6	0.42	.95238095238095238095
7	0.42	.95238095238095238095
8	0.43	.93023255813953488372
9	0.45	.88888888888888888888
10	0.44	.90909090909090909090
11	0.44	.90909090909090909090
12	0.52	.76923076923076923076

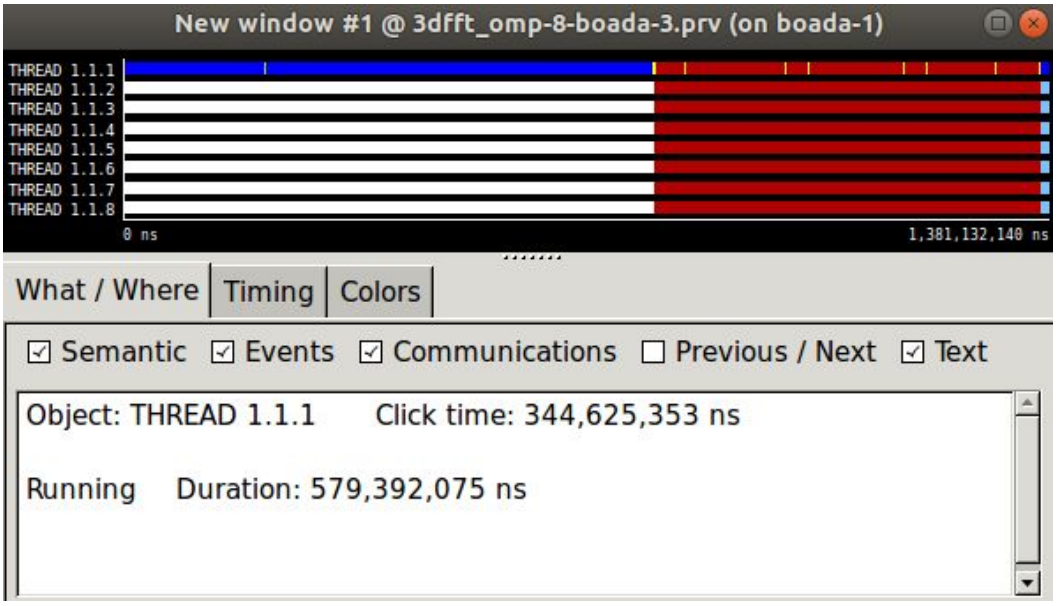
3. Analysis of task decompositions for *3DFFT*

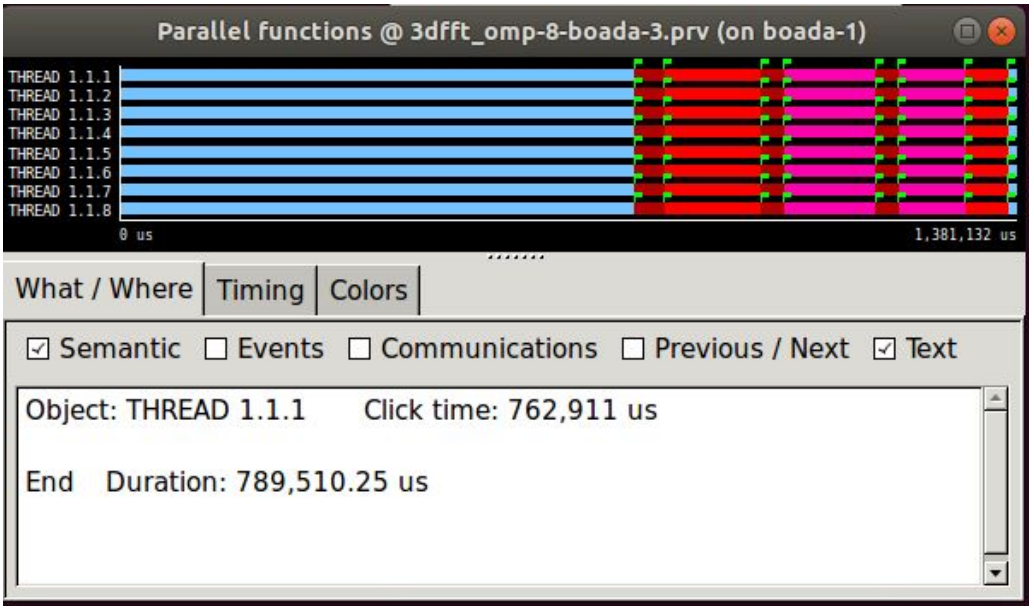
Version	**T1**	**Tinf**	**Parallelism**
seq	639.780.001	639.780.001	1
v1	639.780.001	639.707.001	1(~)
v2	639.780.001	361.378.001	1.77
v3	639.780.001	154.730.001	4.13
v4	639.780.001	64.750.001	9.88
v5	639.780.001	64.099.001	9.98



4. Understanding the parallel execution of 3DFFT

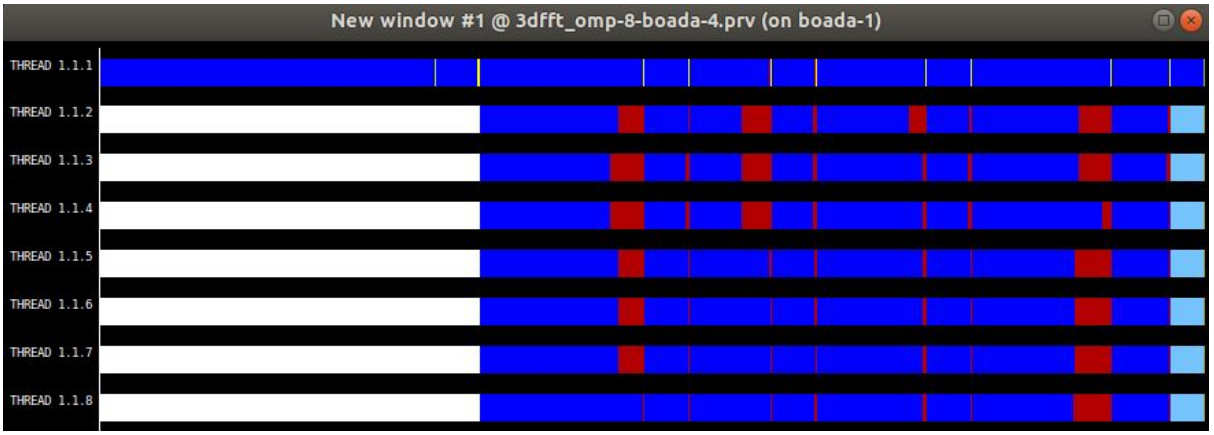
Version	φ	Sinf	T1	T8	S8
initial version in 3dfft_omp.c	0,499	2,9	2.762.264,14	1.381.132,14	1,7
new version with improved φ	0,9	10,56	2.2346.235,97	1.039.019,12	2,26
final version with reduced parallelisation overheads	0,89	9,21	2.305.497,84	602.368.88	3,83

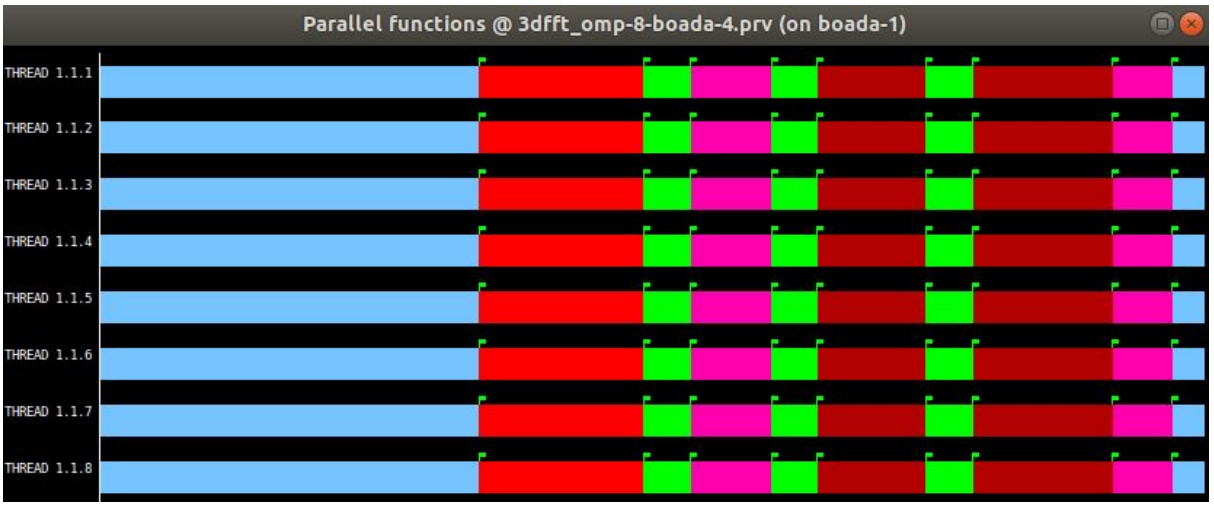




In the second version of the code, due to the overheads that the parallelism itself is creating, the results are far from what we expected.

In the third version, we delete great part of these overheads and that gives us a great improvement, but the problem now is the sequential part.


New window #1 @ 3dfft_omp-8-boada-4.prv (on boada-1)
THREAD 1.1.1
THREAD 1.1.2
THREAD 1.1.3
THREAD 1.1.4
THREAD 1.1.5
THREAD 1.1.6
THREAD 1.1.7
THREAD 1.1.8


Parallel functions @ 3dfft_omp-8-boada-4.prv (on boada-1)
THREAD 1.1.1
THREAD 1.1.2
THREAD 1.1.3
THREAD 1.1.4
THREAD 1.1.5
THREAD 1.1.6
THREAD 1.1.7
THREAD 1.1.8