ESiWACE – NEMO working group

1km feasibility– 10/04/2019

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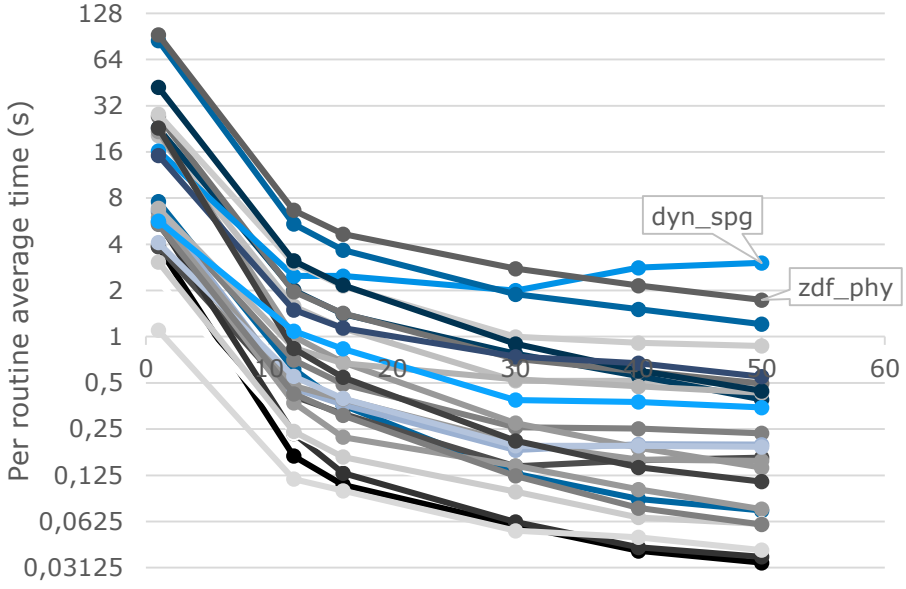
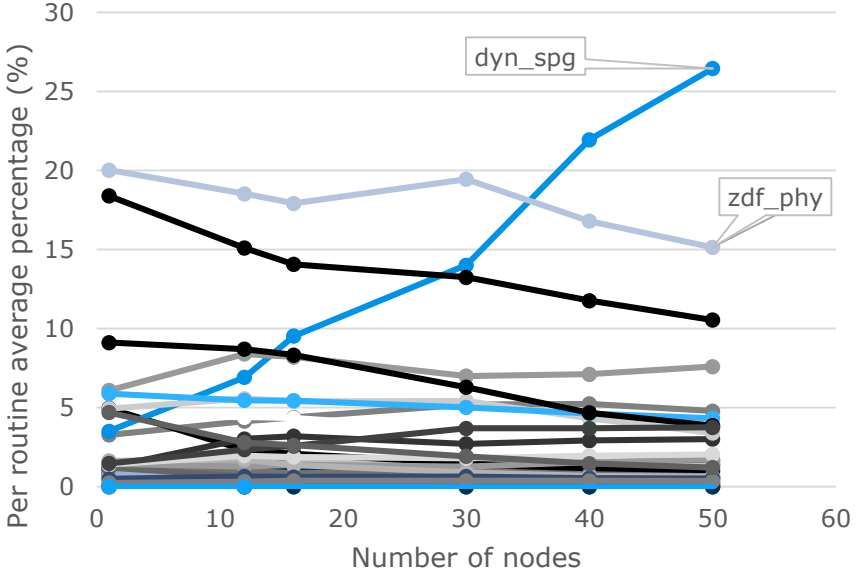
BENCH1 – Strong scalability

NEMO – BENCH1 – Routines comparaisons

Strong scalability (up-to 10x10x75 subdomains)

Without init and restart – no stpctl – Square decomposition - nnperio 7
2x SKL20c per node - 1000 iterations
Turbo - THP - no MMAP - no HT
Intel MPI 18.2.199 – MPI bounds to physical cores





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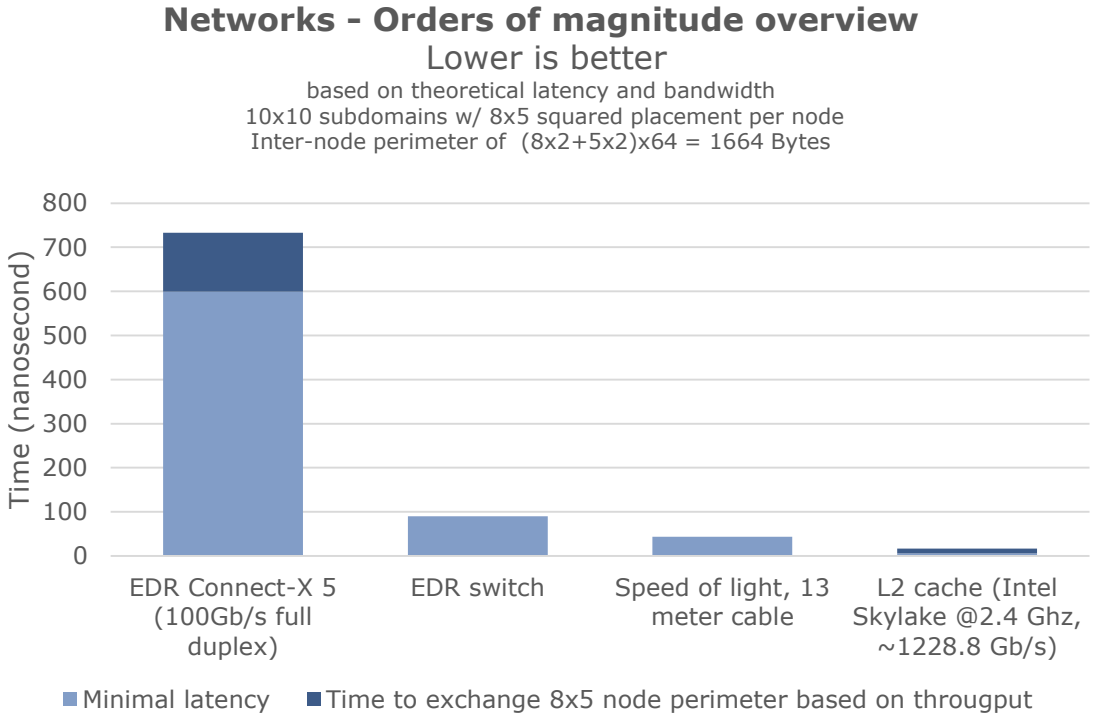
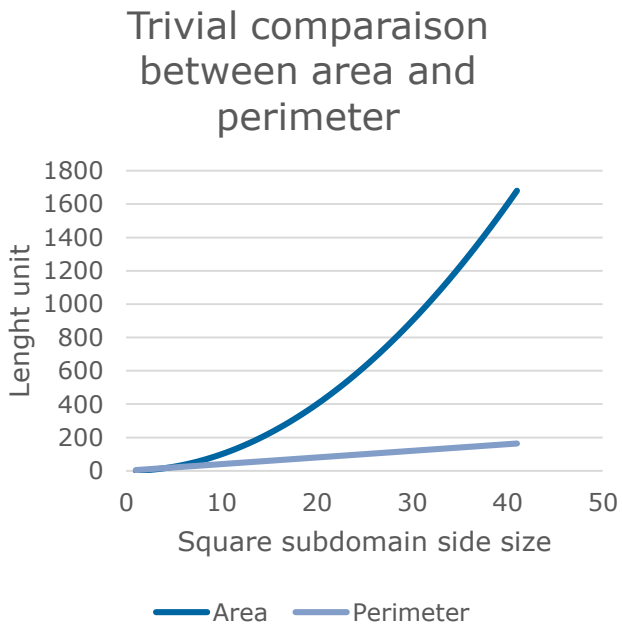
Communication/computation comparison





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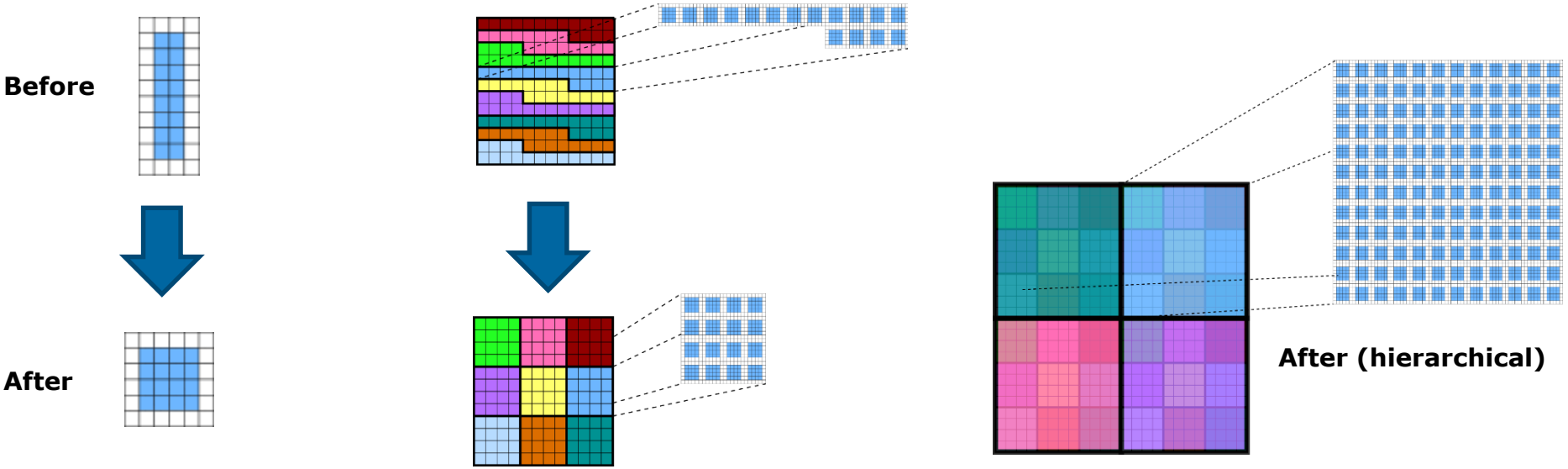
Square for large boundaries exchanges

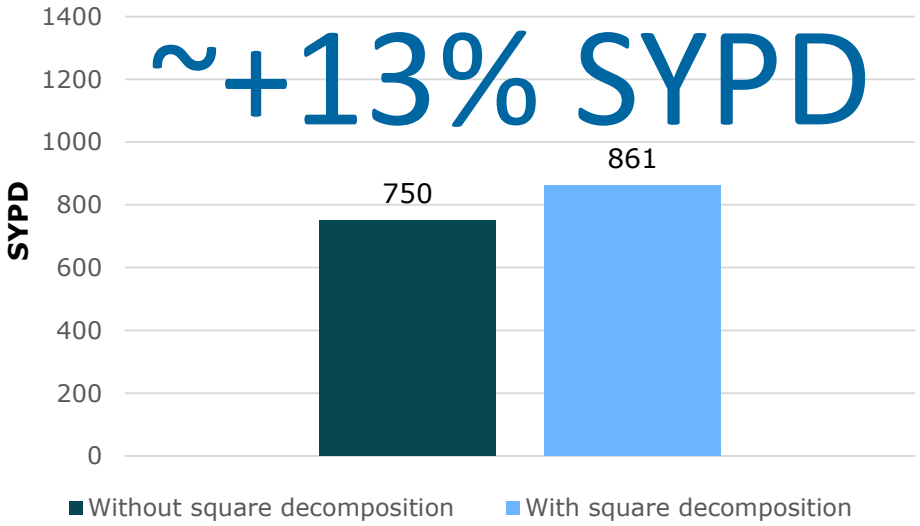


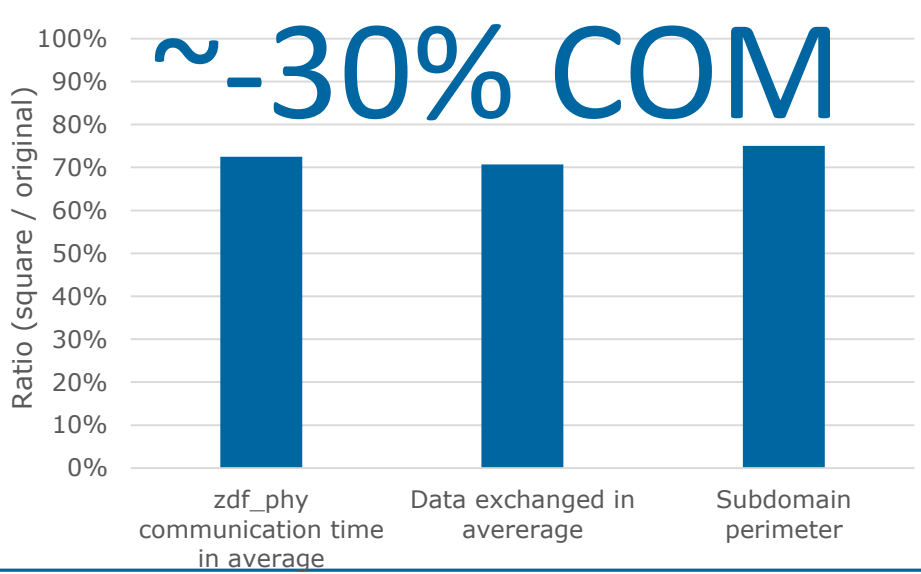
Square for large boundaries exchanges

NEMO ocean – BENCH1

Square subdomains

362x332 – 1000 iterations - 50 nodes - same node for both
Without init and restart – no stpctl - 11x10 instead of 5x23 subdomains
Each node w/ 2x Intel SKL20c 6148@2.4Ghz- 192GB memory
Mellanox EDR connect-x-4 (100 gb/s) - fat-tree topology
Turbo - THP – no MMAP - no HT – Intel MPI 18.2 bounded to physical cores





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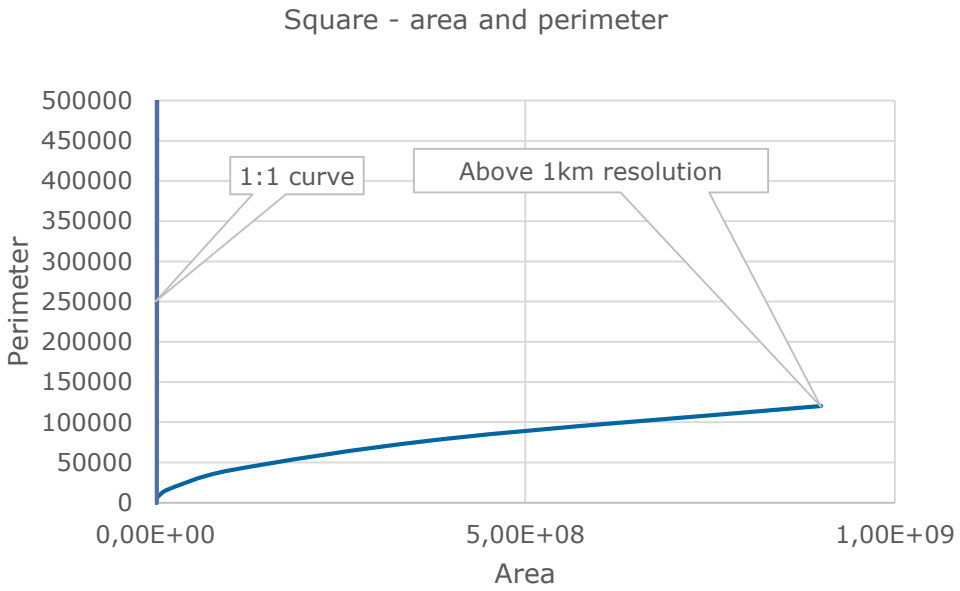
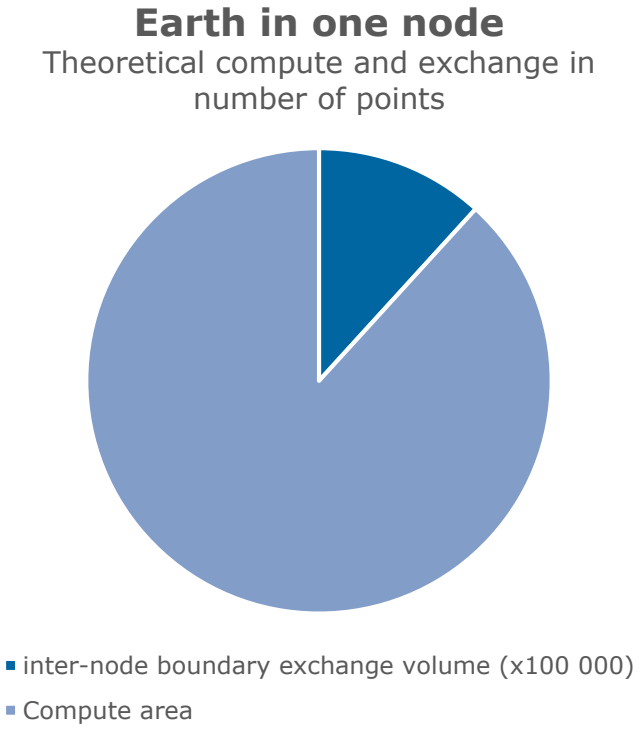
Dense node for feasibility





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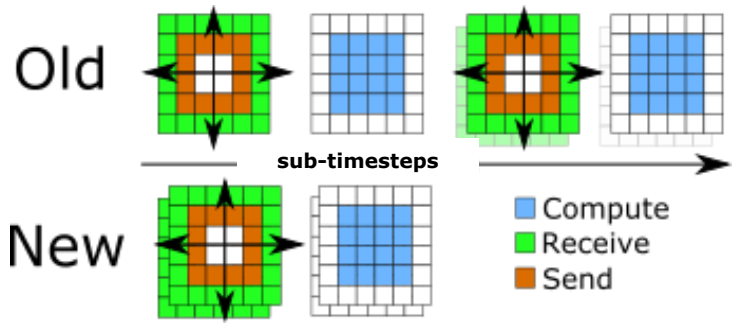
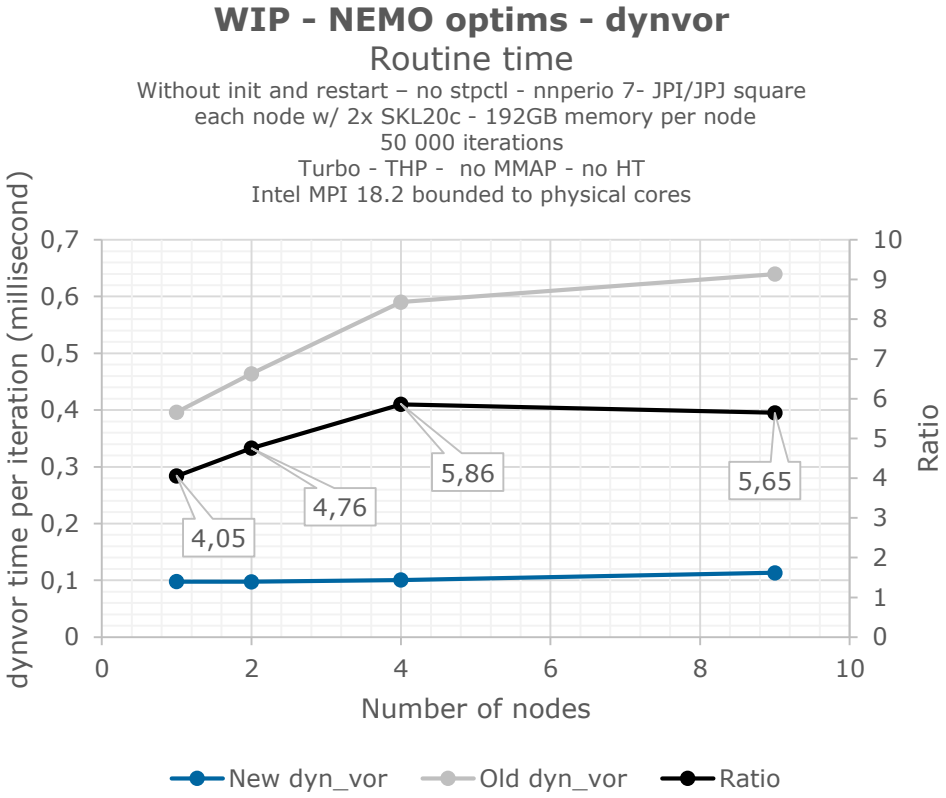
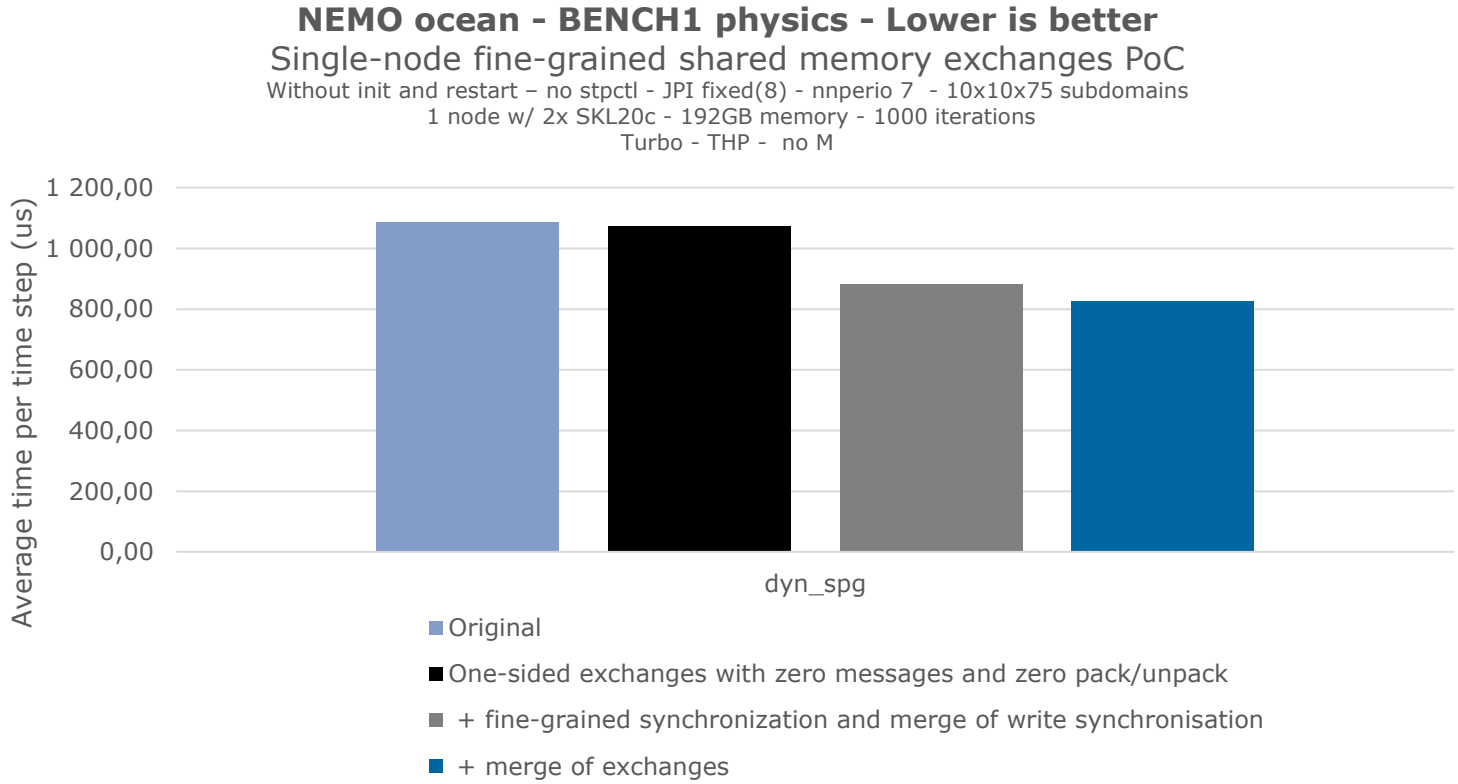
Aggregate 2D layers for small exchanges

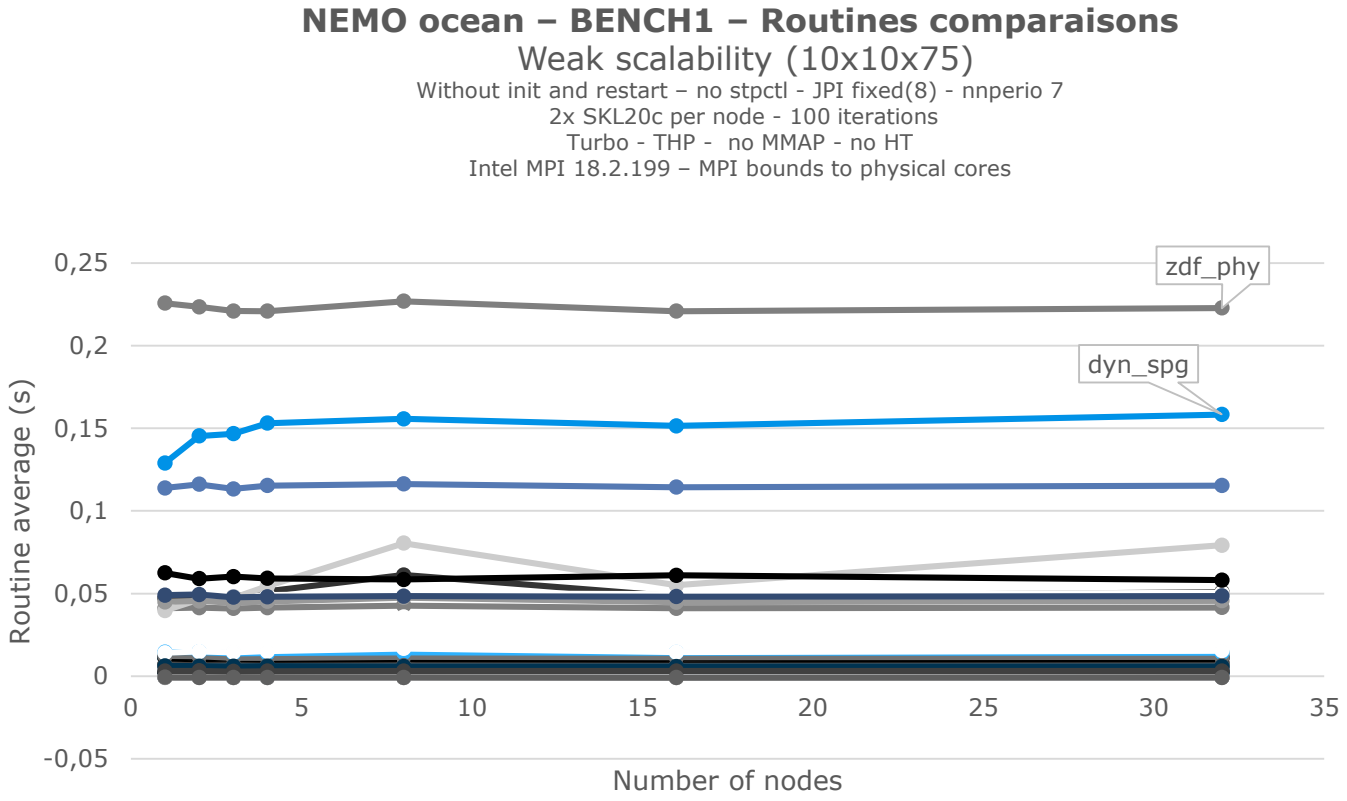




Low latency for small exchanges - PoC



Weak scalability for extrapolation



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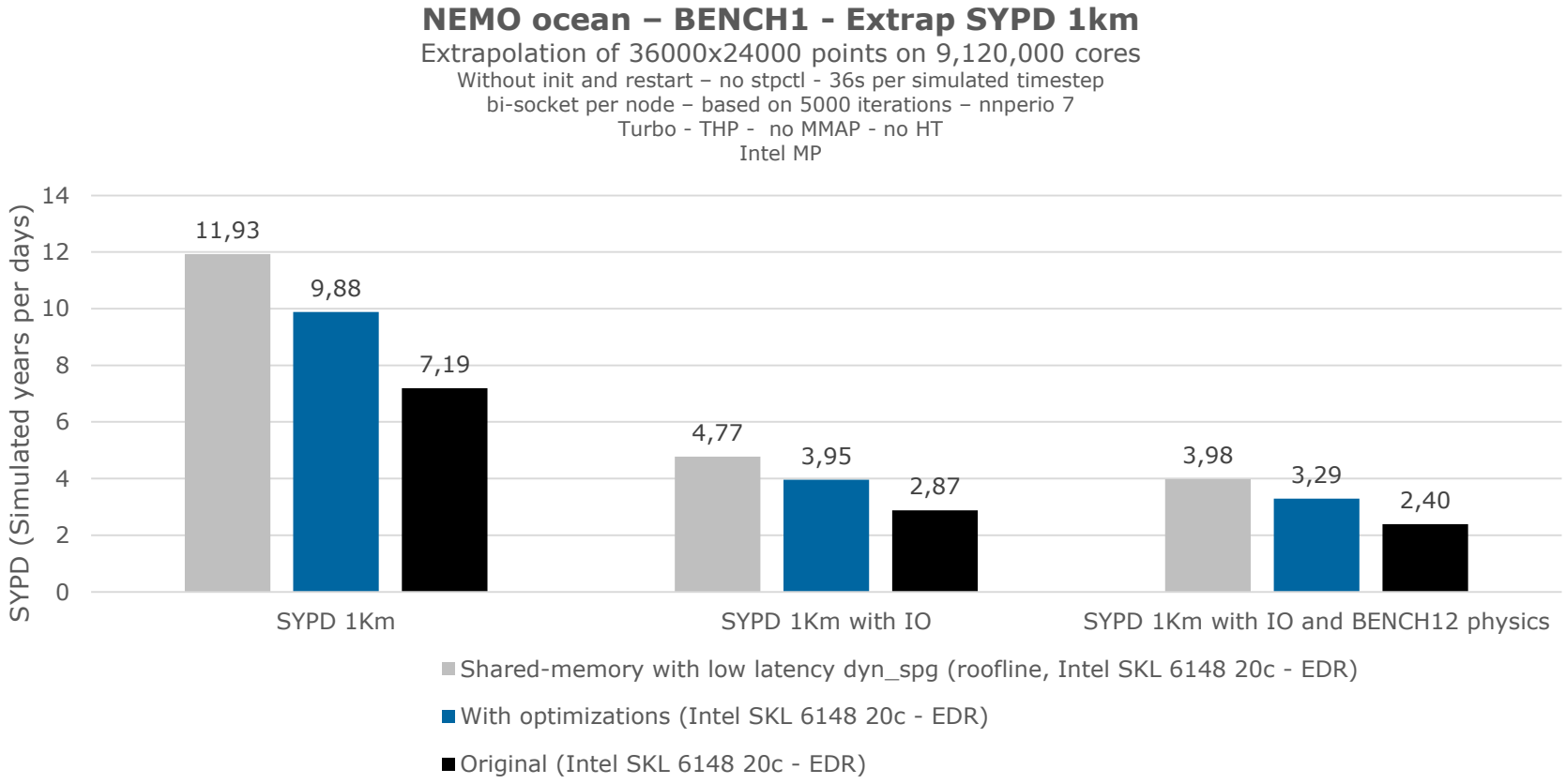
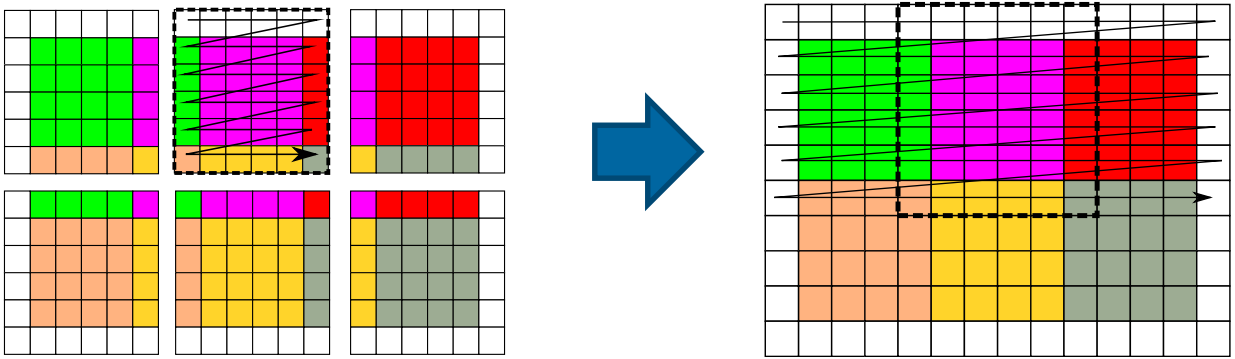
BENCH at 1km –Extrapolation



Still On-Going…

- MPI Shared Memory contiguous (identical to a coarse grain OpenMP approach)
  - **zero copy**
  - **zero ghost zone** → decrease memory usage
  - no loop modification, transparent (with fortran array shape)
  - but false sharing (to real small size: 10x10 < Page size)



non-c. subdomains

c. subdomains

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Thanks

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