Barcelona Supercomputing Center
Centro Nacional de Supercomputación

EXCELENCIA SEVERO OCHOA

Why is performance analysis important?

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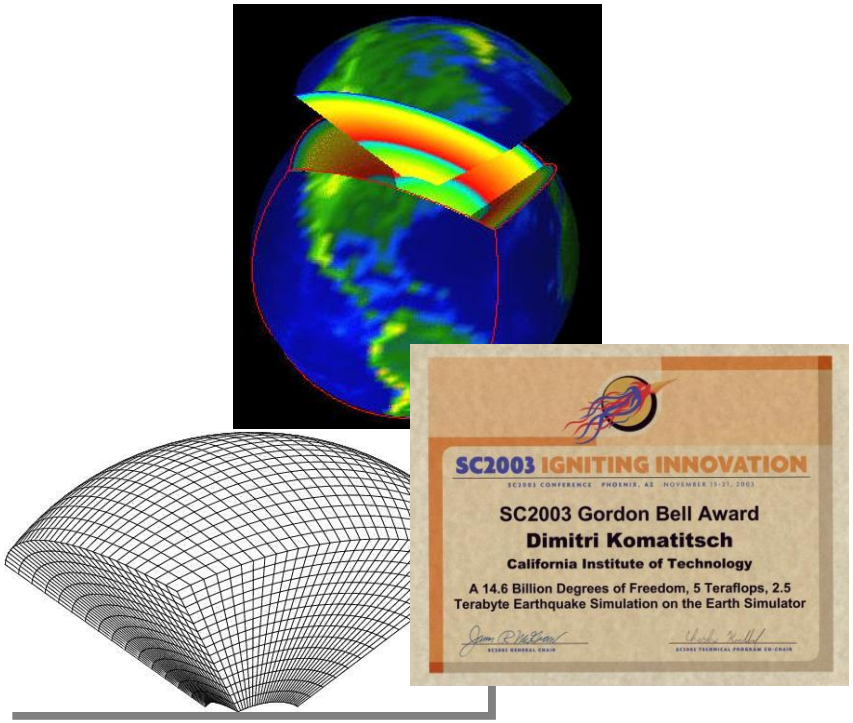
MNHACK, Barcelona

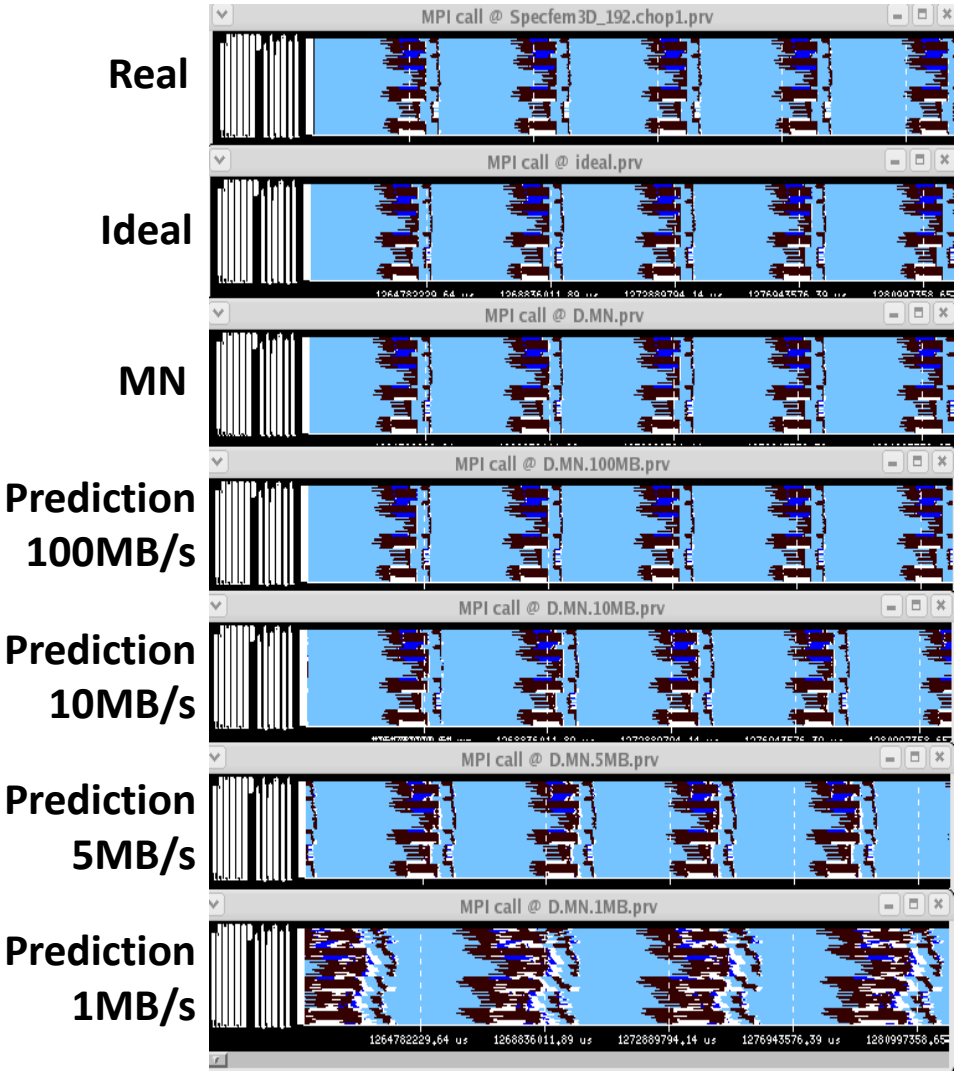
Would I will benefit from asynchronous communications?

SPECFEM3D

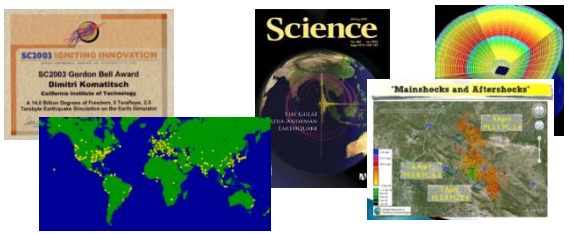


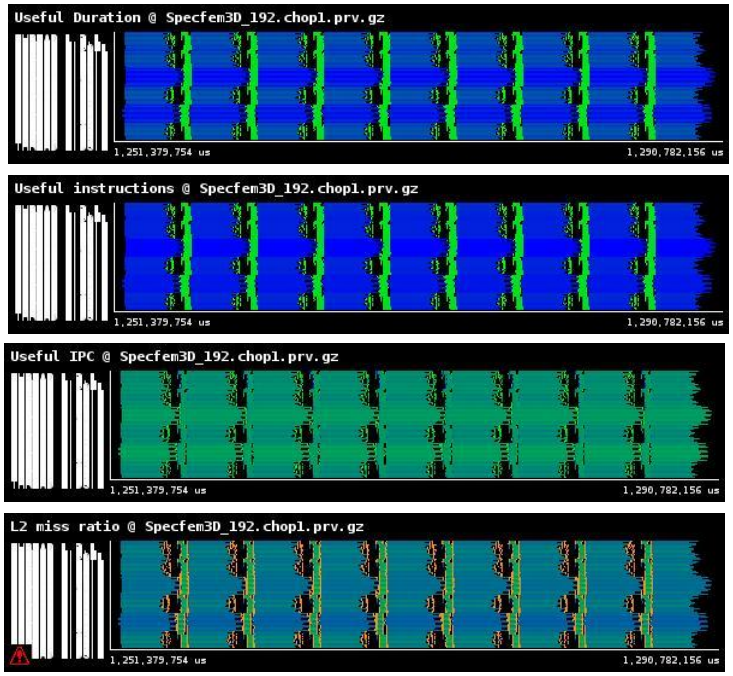
Courtesy Dimitri Komatitsch

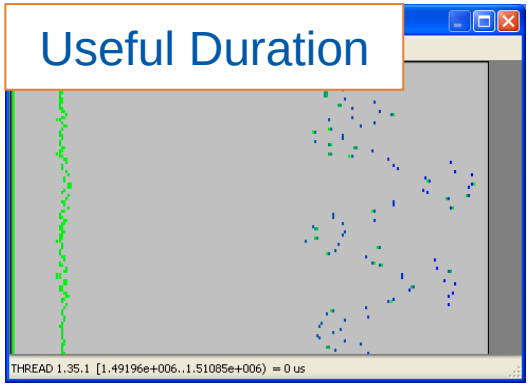
MPI calls

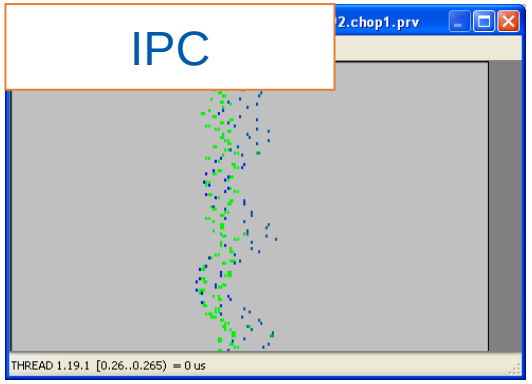


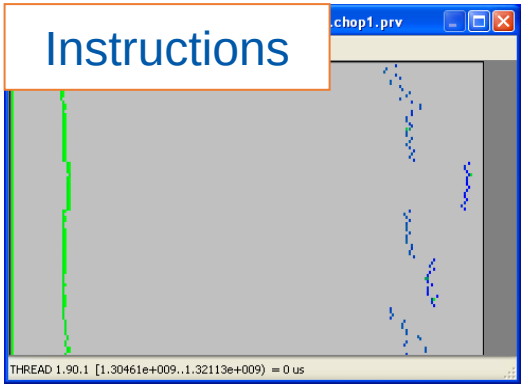
Would I will benefit from asynchronous communications?

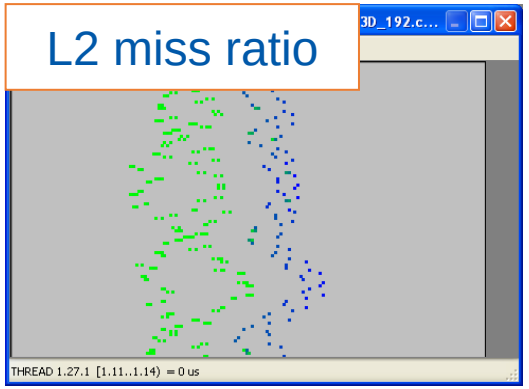






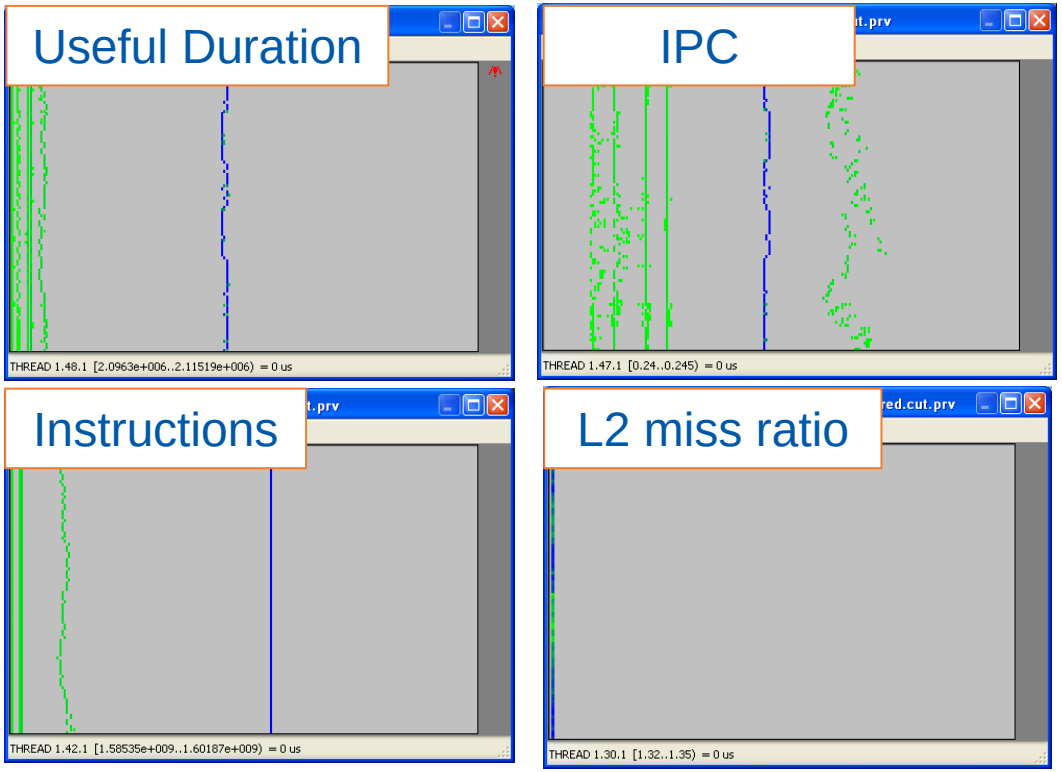






Would I will benefit from asynchronous communications?

- By the way: six months later ….

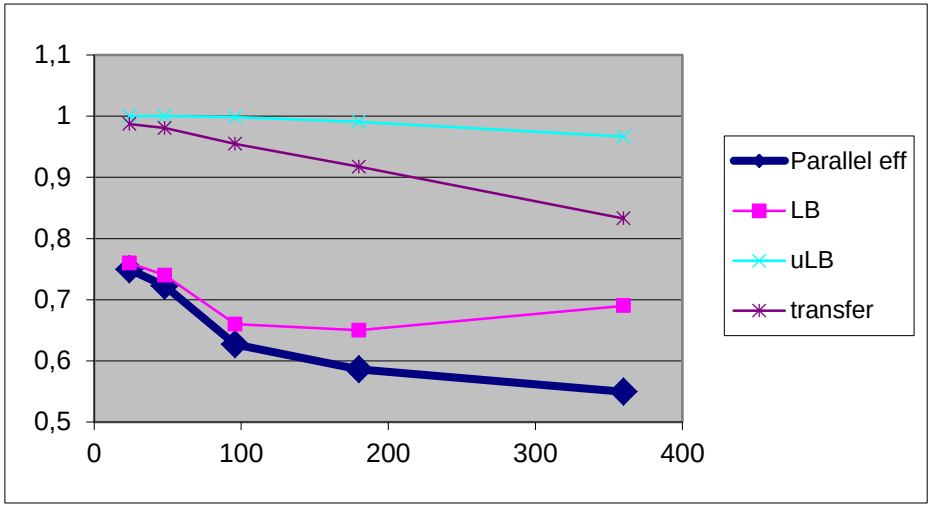


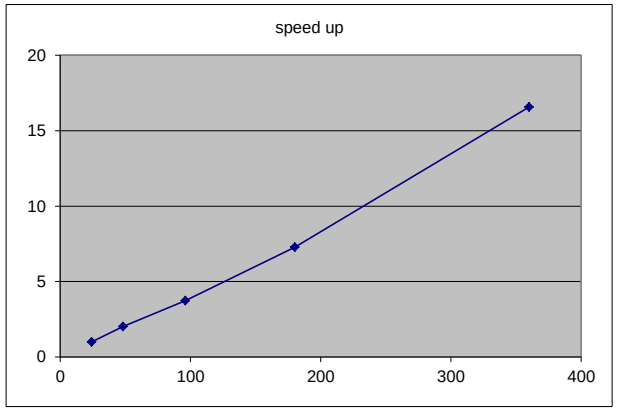
Why scaling?

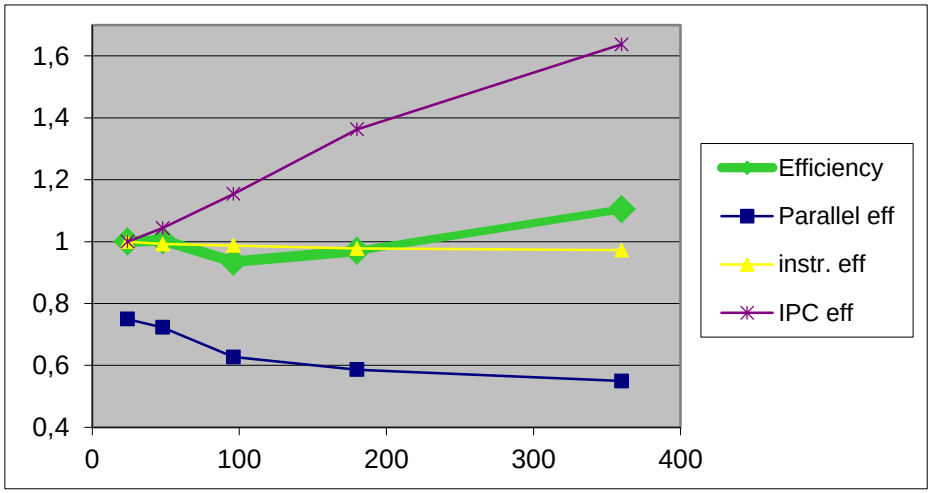
$$\eta_{\parallel} = LB * Ser * Trf$$

CG-POP mpi2s1D - 180x120

Good scalability!
Should we be happy?



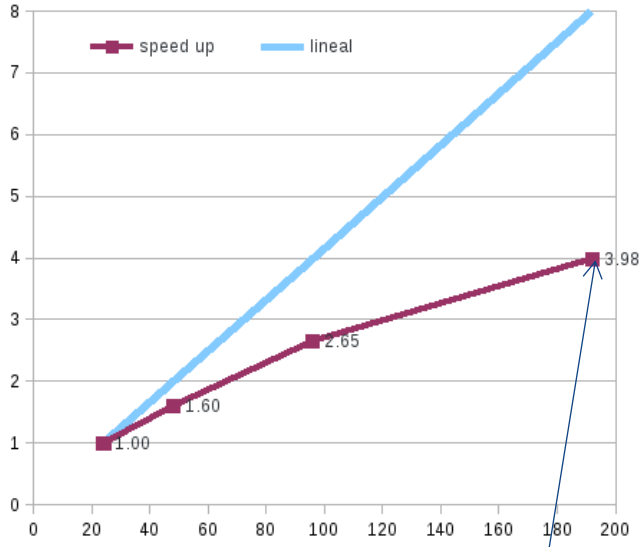




$$\eta = \eta_{\parallel} * \eta_{instr} * \eta_{IPC}$$

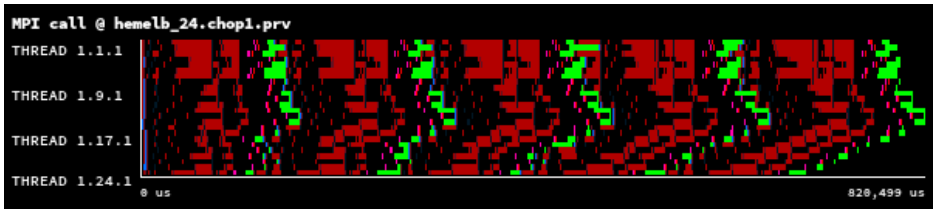
POP Case

- Scalability of the FOA
  - Speed-up achieved vs. lineal
  - Phase distribution when scaling – uniform? Some region becomes more relevant?



50% of linear speed-up

24 cores



192 cores

Similar ratio between phases, but far from linear

POP Case

- Efficiency model
  - Execution vs. Scaling
  - Above 0.8 is considered good
  - These numbers will drive the analysis

	24	48	96	192
Global efficiency	68.29	54.66	44.96	33.83
Parallel efficiency	68.29	57.82	46.06	42.52
Load Balance	68.45	58.09	46.62	44.04
Communication	99.75	99.53	98.79	96.55
Computation scalability	100	94.54	97.61	79.56

Poor parallel efficiency for the lowest core count

Lower value for the smallest core count and main factor that limits scalability

	24	48	96	192
IPC Scaling efficiency	100	98.63	95.57	95.02
Instructions Scaling eff.	100	97.69	94.83	89.44

Both components correlated with degradation

Big drop – user hints to explain it