First Results on the Energy Consumption of a Simple Numeric Code

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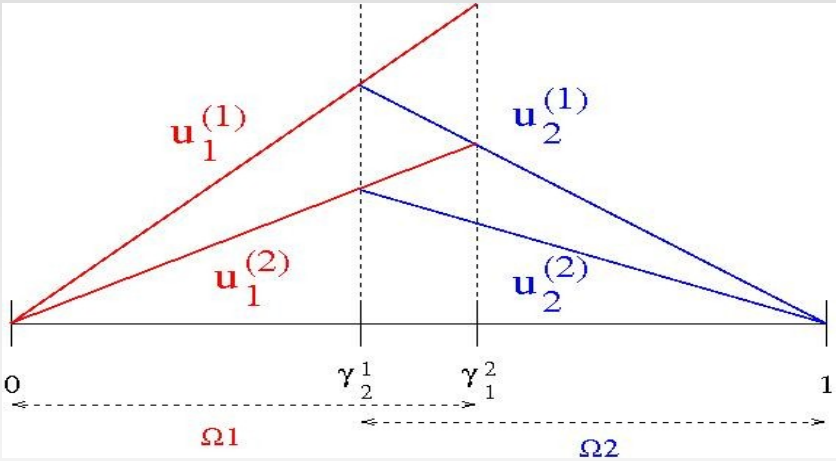
- Physical context: 2D Convection-Diffusion equation

$$\begin{cases} \text{Find } u \text{ solution of} \\ -\nu\Delta u + a\frac{\partial u}{\partial x} + b\frac{\partial u}{\partial y} + cu = f, \text{ in } \Omega \\ u = 0 \text{ on } \partial\Omega \end{cases}$$

- Parallel Algorithm: Schwarz alternating method (iterative method)



- MPI-Fortran code

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- Working environment (PireGrid : Pau site)
  - Hardware : 16 physical hosts, 128 (real and virtual) cores
    - Intel Xeon E5520 (2.27 Ghz)
    - 8 cores / 24 GB of RAM
    - 4 Xen virtual machines (4GB RAM, 2 Cores) per host
  - Software
    - middleware : gLite + openMPI
    - monitoring NRG (1/sec) : racadm (Dell) + IPMI

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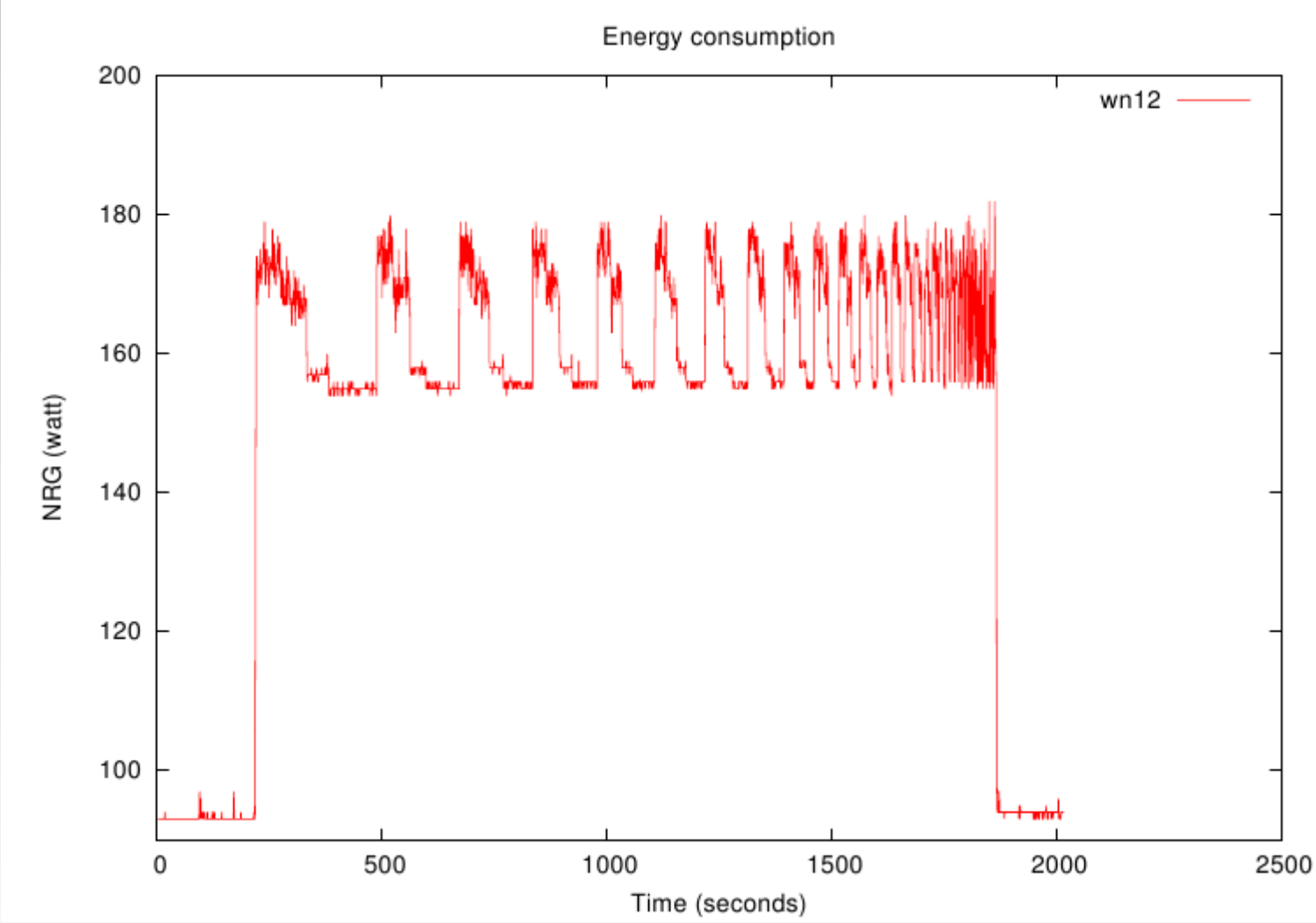

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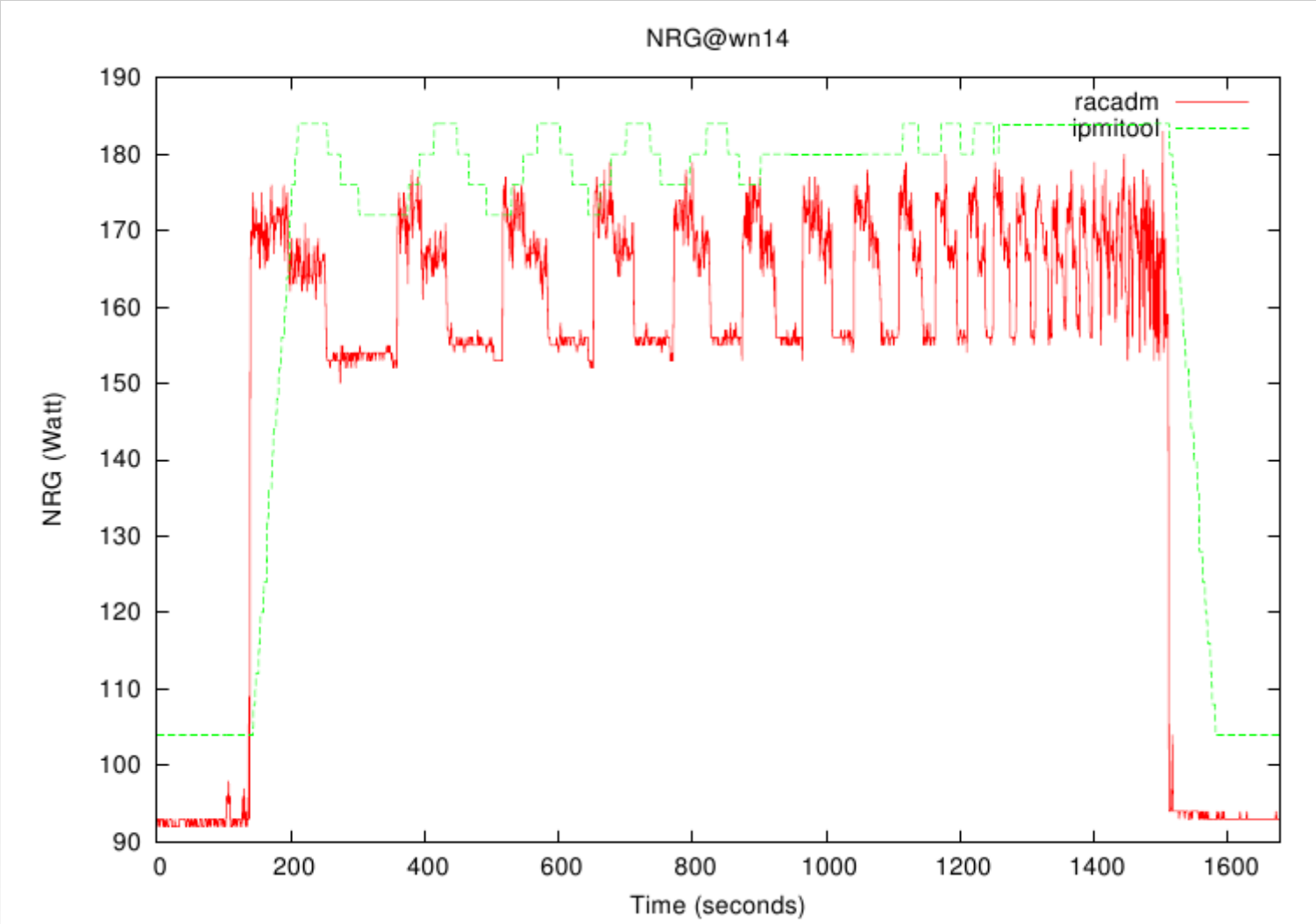

- Future Works
  - Static and dynamic analysis for phase detection in the code
  - System adaptation to save energy regarding the phases
  - Study real numerical codes:
    - MUMPS (Direct Solver)
    - Block-Cimmino (Iterative Solver)
    - Spectral Clustering code