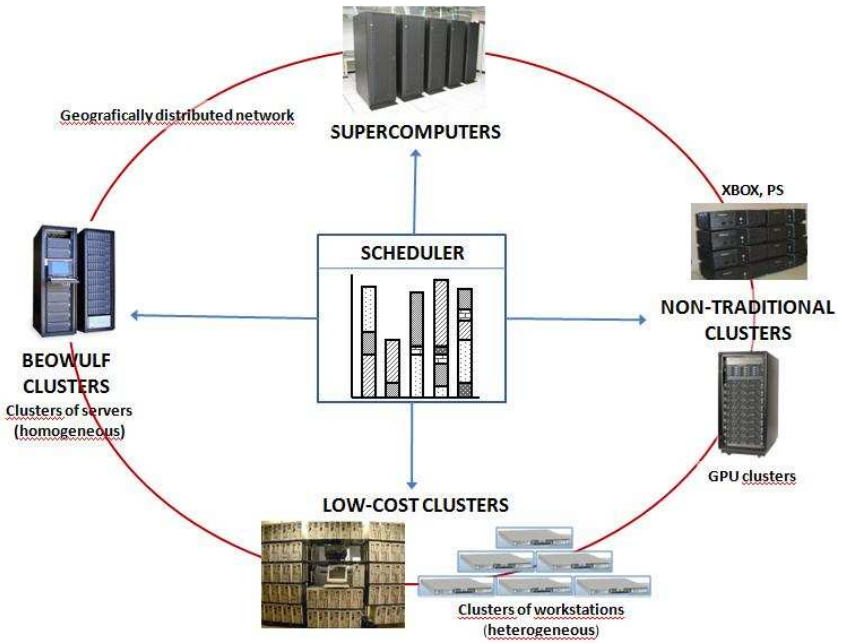
HETEROGENEOUS COMPUTING SCHEDULING WITH EVOLUTIONARY ALGORITHMS

Scheduling: a key problem in distributed heterogeneous computing environments.



HCSP

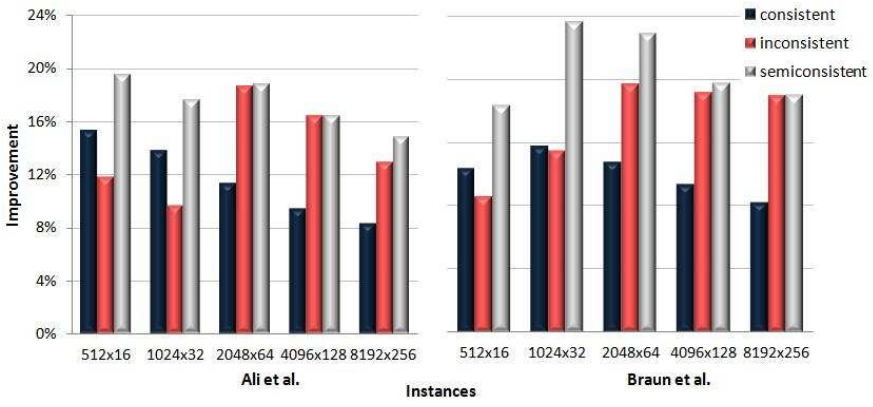
- Machines $P=\{m_1,\ldots,m_M\}$, tasks $T=\{t_1, \ldots, t_N\}$, execution time function $ET : P \times T \rightarrow R^+$ [$ET(t_i,m_j)$ is the time required to execute the task t_i in the machine m_j].
- HSCP: find an assignment of tasks to machines (function $f : T^N \rightarrow P^M$) which minimizes the makespan: $\max_{m_j \in P} \sum_{\substack{t_i \in T: \\ f(t_i)=m_j}} ET(t_i, m_j)$

Parallel evolutionary algorithms

Evolutionary algorithms (EAs): stochastic methods that emulate the evolutionary process of species in nature, in order to solve optimization, search, and other related problems. Parallel models improve the efficiency of EAs, allowing reaching high quality results in a reasonable execution time even for hard-to solve optimization problems.

Results

Parallel EAs allow tackling large HCSP instances (up to 8192 tasks and 256 machines). Three categories: consistent, inconsistent and semiconsistent problem instances.



Improvements over traditional heuristics

HCSP website: http://www.fing.edu.uy/inco/grupos/cecal/hpc/HCSP