A Novel Resource-Driven Job Allocation Scheme for Desktop Grid Environments

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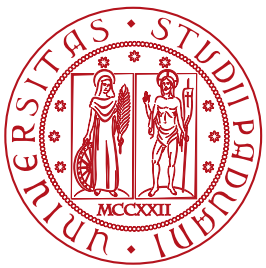
February 26, 2010



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Grids

- Desktop Grid: exploit the idle computational resources of a large amount of non-dedicated heterogeneous machines
- Required key services as resource management and scheduling
- Well known major challenge: matching tasks with available resources

The Framework

- Machines are described by a d-dimensional *velocity vector*, where each component quantifies a feature of the machine (e.g., CPU speed, disks bandwidth, network bandwidth)
- Jobs are described by a d-dimensional *composition vector*, which specifies how the job's operations will be distributed among the machines' features (i.e., the components sum to 1)

Then, the suitability of a machine for a job is quantified by a score similar, in spirit, to the inner product between the above vectors. This is also affected by the current load of machines (i.e., number of running jobs, and load due to the machine's user)

Allocation and Relocation Procedures

Allocation variants

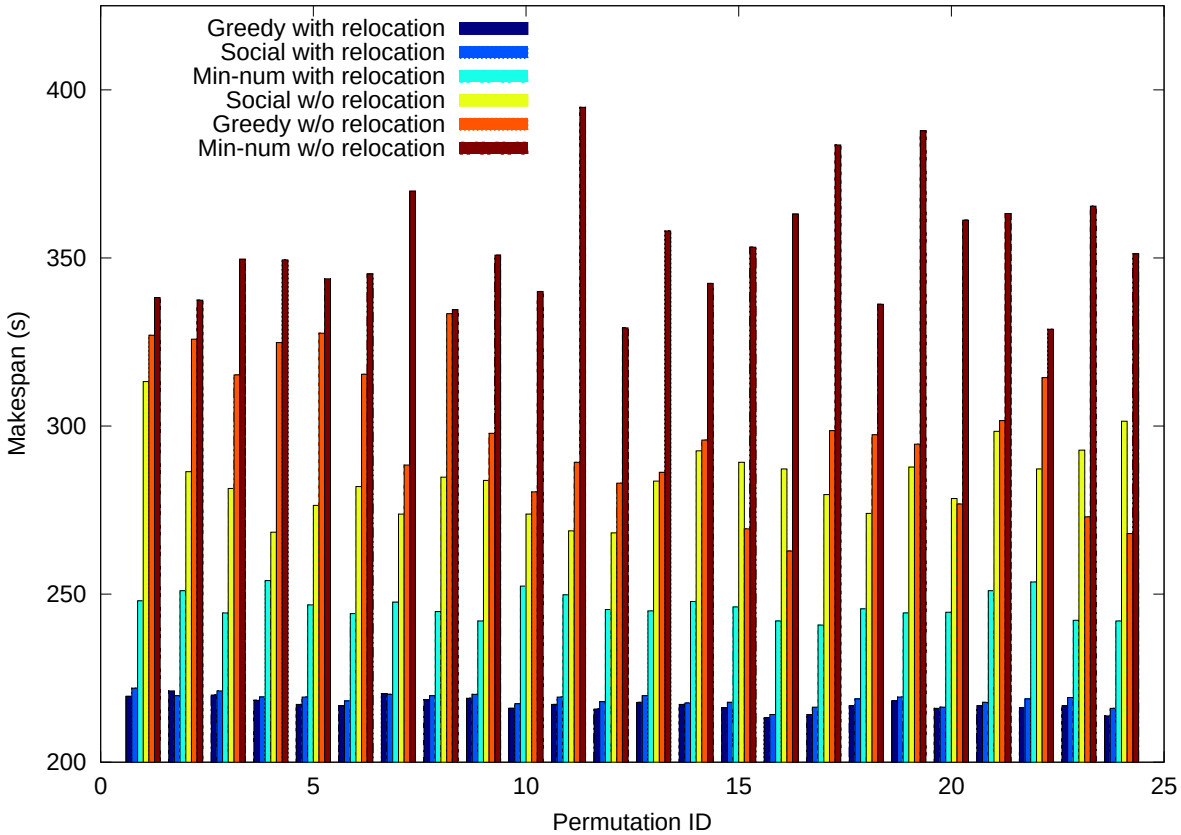
- MIN-NUM: job dispatched to the machine with least number of jobs
- GREEDY: job dispatched to the machine which maximizes the job's score on it
- SOCIAL: job dispatched to the machine which maximizes the overall sum of the jobs' scores

Relocation

- May be performed when a job finishes, or when the machine's owner changes his load
- Three variants, similar to their allocation counterparts

Experimental Results

Makespan results. 4 arrival times, 4 job groups, 1 job group for each arrival time, 24 job group/arrival times combinations (x-axis).



- The resource-driven variants greatly outperform MIN-NUM
- Relocation greatly improves performances
- SOCIAL performs better than GREEDY in most cases