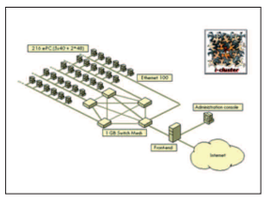
Execution architecture

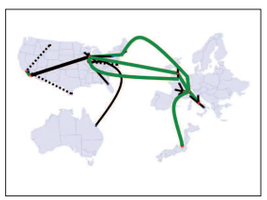
- Sequential platforms (Unix platforms: Linux, MacOS, etc)
- On top of underlying middlewares for high performance / high throughput computing
  - Parallel architectures (SMPs) using PThreads
  - Distributed platforms (Clusters) with MPI
  - Grids (Globus, Condor-G / MW)
- Transparence and efficiency at execution

Parallel Computing



Cluster Computing

Parallel ComputingHigh-Throughput Computing



Grid Computing

Paradiseo

http://paradiseo.gforge.inria.fr

DOLPHIN team

The goal of the DOLPHIN team is the modeling and parallel resolution of large (multi-objective) combinatorial optimization problems. Efficient parallel cooperative optimization methods are developed from the analysis of the structure of the solved problem. The target optimization problems are generic problems (flow-shop scheduling, vehicle routing, etc.) and industrial problems from telecommunications and genomics.

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Paradiseo

INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE

INRIA FUTURS

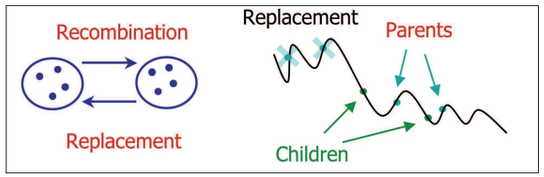
A Framework for Metaheuristics, Hybrid and Parallel Metaheuristics

Paradiseo

A C++ white-box object-oriented framework dedicated to the reusable design of metaheuristics

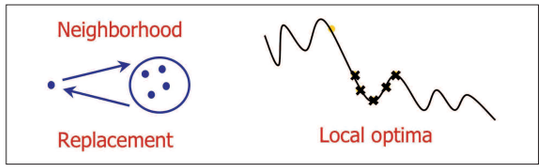
Population based metaheuristics

Evolutionary algorithms, scatter search, particle swarm, etc.



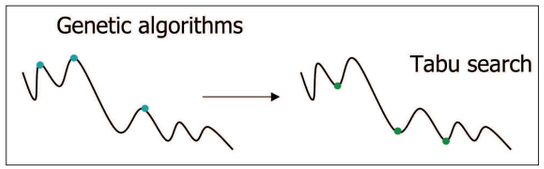
Single solution based metaheuristics

Local search, simulated annealing, tabu search, etc.



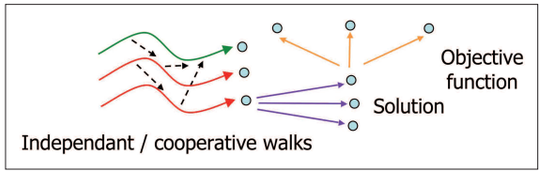
Hybridization

- Balancing between diversification and intensification
- Delivering better and robust solutions



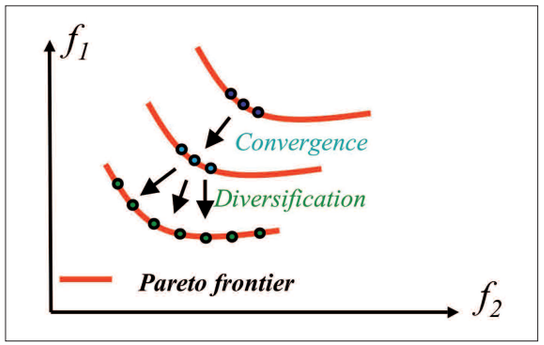
Parallelism

Speedups the search to solve large problems based on three hierarchical models



Multi-objective features

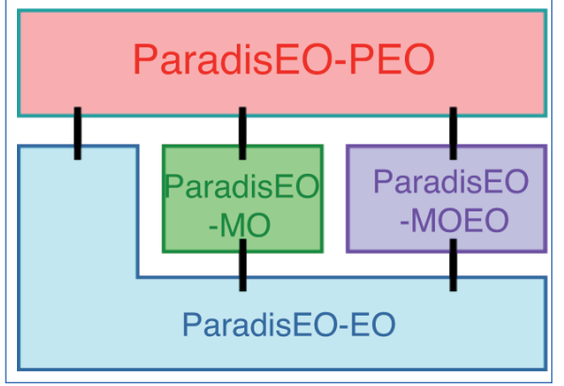
-Enabling the Pareto approach at resolution
-Most common fitness assignment strategies (i.e. the ones used in MOGA, NSGA, NSGA-II, SPEA, SPEA2, IBEA ...)
-Diversification techniques (niching ...)
-Elitism (archive management)
-Metrics for performance evaluation (contribution, entropy …)



Design architecture

- Several complementary modules
  - ParadisEO-EO (Evolving Objects) for population based metaheuristics
  - ParadisEO-MO (Moving Objects) for single solution metaheuristics
  - ParadisEO-MOEO (Multi-Objective Evolving Objects) for multi-objective optimization
  - ParadisEO-PEO (Parallel and Distributed Evolving Objects) for models of parallelization and hybridization.

- A clear conceptual separation of the solution methods from the problems they are intended to solve, thus conferring a maximum code and design reuse.



Many experiments lead on the modeling and the parallel resolution of **real and hard problems** from telecommunications, genomics, engineering design, transportation and logistics, physics and chemistry.