Lesson 1: Install ParadisEO and the practices

1 The ParadisEO platform

ParadisEO[1] (PARallel and DIStributed Evolving Objects) is a white-box object-oriented framework dedicated to the flexible design of metaheuristics. Based on EO[2] (Evolutionary Computation Framework), this template-based, ANSI-C++ compliant computation library is portable across both Windows system and sequential platforms (Unix, Linux, MacOS, etc.).

ParadisEO can be used under several environments as the build process (CMake) is able to generate:

- Visual Studio 8 2005 (Win32 + Win64) projects
- Visual Studio 7 .NET 2003 projects
- Visual Studio 7 and 6 projects
- NMake Makefiles
- MinGW Makefiles
- Borland Makefiles
- KDevelop projects
- Unix Makefiles
- Xcode Projects
- MSYS Makefiles
- WMake Makefiles

Paradiseo is composed of several packages that constitute a global framework.

- Paradiseo-EO provides tools for the development of population-based metaheuristic:
  - Genetic algorithm
  - Genetic programming
  - Particle Swarm Optimization
  - ...
- Paradiseo-MO provides tools for the development of single solution-based metaheuristics:
  - Hill-Climbing
  - Tabu Search
  - Simulated annealing
  - Incremental evaluation, partial neighbourhood
  - ...
- Paradiseo-MOEO provides tools for the design of Multi-objective metaheuristics:
  - MO fitness assignment shemes (the ones used in NSGA-II, IBEA ...)
  - MO diversity assignment shemes (sharing, crowding)
  - Elitism
  - Performance metrics (contribution, entropy ...)

[1] http ://paradiseo.gforge.inria.fr/
[2] `http ://eodev.sourceforge.net/`

    * Easy-to-use standard evolutionary algorithms (NSGA-II, IBEA ...)
    * ...

- Paradiseo-PEO provides tools for the design of parallel and distributed metaheuristics:
    * Parallel evaluation
    * Parallel evaluation function
    * Island model
    * Cellular model

Furthermore, Paradiseo also introduces tools for the design of distributed, hybrid and cooperative models:

- High level hybrid metaheuristics: coevolutionary and relay model
- Low level hybrid metaheuristics: coevolutionary and relay model

2 Installation

2.1 ParadisEO

The practices require ParadisEO to be installed on your computer. You can easily process to the installation:

- Make sure to have the following tools available in your environment:
    ▷ `CMake`
    ▷ `Tar` or a similar extractor
- Download ParadisEO (choose the `tar.gz` file) from:
    ▷ `http://www2.lifl.fr/OPAC/Paradiseo/licence/FrmDownload.php`
- Extract the content of the archive:
    ▷ Put the archive `paradiseo-ix86-1.0.tar.gz` in the directory of your choice. Let's suppose you put it in `/home/me/software`
    ▷ Extract it by entering the following line in a terminal: `tar xzf paradiseo-ix86-1.0.tar.gz`
- Install it:
    ▷ `bash installParadiseo.sh` or `sh installParadiseo.sh` if your shell is a "sh" one
    ▷ **Select your generator (Unix Makefiles recommended)**
    ▷ **Select the minimum installation mode by choosing the *basic install***

2.2 The archive dedicated to the practices

To start with the practices, you have to install the archive called `paradiseo_practices_0208.tgz` that you have been given. This archive is also available for download at `http://paradiseo.gforge.inria.fr`.

Let's suppose you have installed ParadisEO into the `/home/me/software` directory. Each time it appears, you are to replace this path with the one corresponding to your ParadisEO installation directory.

When the archive has been extracted, please go in the `practices` directory and edit the `install.cmake` file:

- Fill the `EO_SRC_DIR` variable with the path to ParadisEO-EO :
    `/home/me/software/ParadisEO/paradiseo-eo`
- Fill the `EO_BIN_DIR` variable with the path to ParadisEO-EO build directory :
    `/home/me/software/ParadisEO/paradiseo-eo/build`
- Fill the `MO_SRC_DIR` variable with the path to ParadisEO-MO :
    `/home/me/software/ParadisEO/paradiseo-mo`

- Fill the `MO_BIN_DIR` variable with the path to ParadisEO-MO build directory :

  `/home/me/software/ParadisEO/paradiseo-mo/build`

Then, go in the `build` directory and run :

`cmake ../`

You can now compile the practices using: `make`

3 Archive content

At the top level of the `practices` directory, you must have:

- **tsp/src**: Contains the sources required to solve the TSP problem using ParadisEO. The associated benchmarks are in the **benchs** directory.
- **lesson1**: ParadisEO installation practice, contains `lesson1.pdf`.
- **lesson2**: Contains an implementation of the Hill-Climbing `hill_climbing.cpp` and the corresponding tutorial `lesson2.pdf`.
- **lesson3**: Contains an implementation of a tabu search `tabu_search.cpp` and the corresponding tutorial `lesson3.pdf`.
- **lesson4**: Contains an implementation of the Simulated Annealing `simulated_annealing.cpp` and the corresponding tutorial `lesson4.pdf`.
- **lesson5**: Contains an implementation of a genetic algorithm `gen_algo.cpp` .
- **build**: Contains the built targets and the executables (subdirectories **lesson1**, **lesson2**, **lesson3**, **lesson4** and **lesson5**).