ParadisEO – PEO : Technical introduction

Introduction

This document will teach you the basic knowledge to know to be able to use ParadisEO – PEO.

Requirements

The ParadisEO – PEO package and the library MPICH2 or MPICH-G2 (the MPI implementation dedicated to Globus environment) have to be installed on your computer.

Mapping of resouce

To be able to communicate, the various processes need to follow a mapping of communication. This mapping is defined by an XML file called schema.xml.

Exemple :

```xml
<?xml version="1.0"?>

<schema>
    <group scheduler="0">
        <node name="0" num_workers="0">
        </node>

        <node name="1" num_workers="0">
        <runner>1</runner>
        </node>

        <node name="2" num_workers="1">
        </node>
        <node name="3" num_workers="1">
        </node>

    </group>
</schema>
```

<u>Grammar :</u>

There are four nodes here. The first one has the role of scheduler. The second one is the node on which the algorithm is actually executed. The third and the fourth ones are slave nodes.

If you want to use an other slave node, add :
```
<node name="4" num_workers="1">
</node>
```

If you want to use an other algorithm (island model), add :
```
<node name="1" num_workers="0">
<runner>1</runner>
<runner>2</runner>
</node>
```

Launching the program

To start, launch the startup of the MPD daemon, initiated by the mpdboot command :
```
mpdboot
```

Launching the program in a console may be different (for MPICH-2) : you will have to type the following command in the directory of the lesson:

```
mpiexec -n 4 ./pso @param
```

The "-n 4" indicates the number of processes to be launched. The last argument, "@param", indicates a file which specifies different application specific parameters.

Log file

The log file contains all the communications between the processes. For exemple, you can see the communications of the process 1 thanks to this commande :

```
more log/1
```

Display of the parallel model

Parallel evaluation

Thanks to this model, you will be able to effect your parallel fitness function. You can learn how to use this model in the lesson 1 of ParadisEO - PEO.

Parallel transformation

By using an evolutionary algorithm, you will be able to use a parallel crossover and a parallel mutation (lesson 2 of ParadisEO – PEO).

Island model

The ParadisEO-PEO offers the required components for building in a facile manner a ring of evolutionary algorithms or a ring of PSO which exchange individuals across periodic migrations (lesson 3 of ParadisEO – PEO).

Of course, it is possible to combine the parallel models between them (lesson 4 of ParadisEO – PEO).

You can also see an example of a specific problem (the traveling salesman problem) with an hybridization (lesson 5 of ParadisEO – PEO).