

# ParadisEO – PEO : Lesson 6

Note : All the components are not presented in this lesson (binary, topology, asynchronous or synchronous ... ). To know the completeness of components refer to API documentation of [ParadisEO – EO](#) and [ParadisEO – PEO](#).

## Problem

In the lesson 6 you can execute **several local searches together**.

The problem is the traveling salesman problem (TSP) .

example.cpp :

```
#include <peo>

// Specific libraries (TSP)
#include <param.h>
#include <route.h>
#include <route_eval.h>
#include <route_init.h>
#include <two_opt.h>
#include <two_opt_init.h>
#include <two_opt_next.h>
#include <two_opt_incr_eval.h>

int main( int __argc, char** __argv )
{
    /*
    * In this lesson you will learn to use a multi-start.
    * Thanks to this method, you can use several local searches together !!!
    */

    // Parameter
    const unsigned int POP_SIZE = 10;
    srand( time(NULL) );

    // Initializing the ParadisEO-PEO environment
    peo :: init( __argc, __argv );
    // Processing the command line specified parameters
    loadParameters( __argc, __argv );

    // Define a Hill Climbing (you can choose an other local search)
    // ie Lessons of ParadisEO - M0
    Route route;
    RouteInit init;
```

```

init(route);
RouteEval eval;
eval(route);
TwoOptInit initHC;
TwoOptNext nextHC;
TwoOptIncrEval incrHC;
moBestImprSelect< TwoOpt > selectHC;
moHC< TwoOpt > hc(initHC, nextHC, incrHC, selectHC, eval);

// Define a population
RouteInit initPop;      // Creates random Route objects
RouteEval evalPop;     // Offers a fitness value for a specified Route
object
eoPop < Route > pop(POP_SIZE, initPop);
for ( unsigned int index = 0; index < POP_SIZE; index++ )
    evalPop( pop[ index ] );

// Setting up the parallel wrapper
peoSynchronousMultiStart< Route > parallelHC(hc);
peoParallelAlgorithmWrapper WrapHC (parallelHC, pop);
parallelHC.setOwner( WrapHC );

peo :: run( );
peo :: finalize( );
if ( getNodeRank() == 1 )
{
    std :: cout << "\n\nBefore : \n" << route;
    std :: cout << "\n\nWith the synchronous Multi-Start HCs:";
    for ( unsigned int index = 0; index < POP_SIZE; index++ )
        std::cout << "\n" << pop[ index ];
}
}
}

```

## **Launching the program**

Your file should be called example.cpp - please make sure you do not rename the file (we will be using a pre-built makefile, thus you are required not to change the file names). Please make sure you are in the paradiseo-peo/tutorial/build/Lesson6 directory - you should open a console and you should change your current directory to the one of Lesson6.

### **Compilation :**

- make
- make install

### **Execution (ie Technical Introduction):**

mpixec -n 4 ./example @param