



Málaga, December 2013

Executive Summary

TITLE: D4.2.2: Influence of computing platform on the numerical performance

PAPERS RELATED:

- Nesmachnow, S., Luna, F., and Alba, E. (2015). **An empirical time analysis of evolutionary algorithms as C programs**. *Software: Practice and Experience*, 45:1, pages 111–142, January 2015.

ABSTRACT:

This deliverable presents an empirical study devoted to characterize the computational efficiency behavior of an evolutionary algorithm (usually called canonical) as a C program. The study analyzes the effects of several implementation decisions on the execution time of the resulting evolutionary algorithm. The implementation decisions studied include: memory utilization (using dynamic vs. static variables and local vs. global variables), methods for ordering the population, code substitution mechanisms, and the routines for generating pseudorandom numbers within the evolutionary algorithm. The results obtained in the experimental analysis allow us to conclude that significant improvements in efficiency can be gained by applying simple guidelines to best program an evolutionary algorithm in C.

GOALS:

1. Perform an empirical analysis oriented to characterize the time efficiency of a basic EA implementation in a strongly typed compiled language such as C.
2. Study the results of an exhaustive experimental analysis studied the impact of several low-level implementation decisions on the execution time of a basic EA for a large set of problem dimensions.

CONCLUSIONS:

1. The main conclusions from the experimental analysis demonstrate that significant improvements in the computational efficiency can be attained by applying simple suggestions when considering the EA as a C program that should be carefully designed and implemented.
2. The empirical analysis allowed us to obtain very promising results when characterizing the time efficiency of the C implementation of the EA.
3. This allows to provide a simple list of best practices for developing efficient EA implementations that can be applied in many academic and industrial scenarios using C as programming language (and other C-like languages).

**RELATION WITH PAST
DELIVERABLES:**

PRE: D4.2.1 (advisable reading)