Deseño de Linguaxes de Programación

Work report

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Wednesday 4th October, 2017

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1 Introduction

This document is meant to display the work made on implementing the same data structure, a binary search tree, and associated algorithms in an array of assorted programming languages.

2 Language: C

Compiler GCC 5.4.0

Operating System Ubuntu 16.04.2 LTS 64 bits

C is an imperative procedural programming language that supports structured programming and recursion. C has a weak and static typing and provides a low-level access to memory, allowing us to make a dinamic and manual memory management. C gives us a lot of control flow tools for our problem:

- Executing a set of statements only if some condition is met (`if-else`).
- Executing a set of statements zero or more times, until some condition is met (`while(condition)`).
- Allows a variable to be tested for equality against a list of values. Each value is called a case, and the variable being switched on is checked for each (`switch-case`).
- Executing a set of distant statements, after which the flow of control usually returns (subroutines).

The C library `stdlib` provides us functions to make a manual memory management of the dinamic memory. In our problem we use two of that functions:

- The `malloc(size)` function allocates "size" bytes and returns a pointer to the allocated memory.
- The `free` function frees the memory space pointed by the pointer.

For the data structure we use `struct`. A user defined data type available in C that allows to combine data items of different kinds. Structures are used to represent a record.

Memory Management

The main differences when it comes to adapt Pascal code to C code are Pascal abstractions in memory management and reference parameters, since C has a lower level memory management.

To inicialize a pointer in Pascal is enough to call the "new" function with the pointer as a parameter, but in order to initialize a pointer in C setting the pointer to the returned

value of the "malloc" function is needed. The "malloc" function requires the size of the pointer in bytes to allocate the memory.

Differences within reference parameters

Pascal has a "VAR" keyword to pass arguments by reference but in C language every argument is passed by value, so passing a pointer to the memory address of the argument is needed in order to modify it.

Unit in C

C needs two files to make a library: a code file (.c) and a header file (.h). The header file provides a program with library functions. Pascal has the header and source code in the same file.

3 Language: Java

4 Language: Ruby

5 Language: OCaml