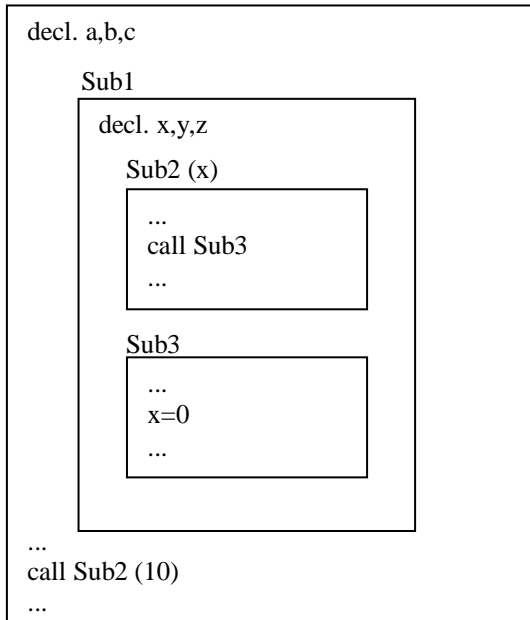


1. In a pure logic language, the execution order of propositions in a clause is nondeterministic. That is, for a clause $A:-B_1, B_2, \dots, B_n$, there is no particular order of execution for the propositions B_1, B_2, \dots, B_n . However, as we know, this order is always from left to right in Prolog (which is not a pure logic language).
 - a) Give an example in Prolog in which this left-to-right ordering affects the efficiency of a program.
 - b) Give an example in Prolog in which this left-to-right ordering affects the correctness of a program (i.e. depending on the order, a program may execute correctly or incorrectly).
2. Compare static scoping and dynamic scoping by indicating their advantages and disadvantages. Explain item by item (i.e. consider each advantage/disadvantage of one method over the other as an item) and include at least eight items. For each item, write the advantage/disadvantage, give an explanation and give an example.
3. Explain the advantages and disadvantages of pass-by-name mechanism over other mechanisms. Explain item by item (i.e. consider each advantage/disadvantage as an item) and include at least five items. For each item, write the advantage/disadvantage, give an explanation and give an example.
- 4.

Main



Consider the given contour diagram for a statically-scoped language. Execution begins by the subprogram *Main*.

Explain the compilation process of this program, i.e. what is done by the compiler when the statements *call Sub2(10)*, *call Sub3*, and $x=0$ are processed. That is, what calculations are performed (for subprogram linkage and nonlocal access) and what type of machine code is generated.

Explain the execution of this program, i.e. what is done by the run-time system when the statements *call Sub2(10)*, *call Sub3*, and $x=0$ are executed. That is, what is done when a subprogram is called and how the data of a variable is accessed when it is referenced. Show the contents of the run-time stack.

Note that this program may be erroneous. If so, indicate which are the erroneous parts, why, and what is the effect on the compilation and execution. Even if there may be errors, explain the compilation and execution processes as indicated above; do not say something like "... compiler stops here so program is not executed ...".

Notes:

- Questions 1-4 : 25 points
- Time: 1:45 hours
- Close notes and books

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