Computer Architecture and Programming Languages
Jacobs University Bremen
Dr. Kinga Lipskoch

Course: CO20-320241
December 3rd, 2019

Homework 12 - Programming Languages and Compilation

- Template file for submitting the solutions:
  https://grader.eecs.jacobs-university.de/courses/320241/2019_2/lectures/template_hw.tex
- The TAs are grading solutions to the problems according to the following criteria:
  https://grader.eecs.jacobs-university.de/courses/320241/2019_2/Grading_Criteria_CAPL.pdf

Bonus Problem 12.1 *Programming language classification* (1 point)

Use the different classifications from the slides (Lecture 22 & 23) as well as textbooks and/or online sources to prepare a table with characteristics of the following programming languages according to the classifications mentioned above: C, C++, B, Java, Python, Ruby, Pascal, Basic, Smalltalk, Perl, PHP, and Prolog.

Bonus Problem 12.2 *Grammar for the ternary operator* (2 points)

Write a grammar which rules can generate assignments involving the ternary operator, for example, `variable = condition ? expr1 : expr2;`. For simplicity reasons you can consider that expressions are either simple assignments or assignments involving the one of the four arithmetic operators with two operands, where the operands are variables. Conditions should be defined as relational conditions between variables. You do not have the define variables. You can consider them to be terminals.

Bonus Problem 12.3 *Grammar for `while` loops* (2 points)

Write a grammar which rules can generate `while` loops together with their bodies. You should be able to consider bodies consisting of one statement and multiple statements. For simplicity reasons consider `identifier` and `constant` as non-terminals which you do not have to define/generate. Also you can assume that the condition of the `while` loop is of form (`identifier rel identifier`) or (`identifier rel constant`) where `rel` is one of the relational operators. For simplicity reasons you can consider that statements are either simple assignments or assignments involving the one of the four arithmetic operators with two operands.

How to submit your solutions

You can submit your solutions via *Grader* at **`https://grader.eecs.jacobs-university.de`** as a generated PDF file from the given template TEX file.
If there are problems with *Grader* (but only then), you can submit the file by sending mail to `k.lipskoch@jacobs-university.de` **with a subject line that starts with CO20-320241**.

Please note, that after the deadline it will not be possible to submit solutions. It is useless to send solutions by mail, because they will not be graded.

This homework is due by Monday, December 9th, 23:00.