TDT4205 Problem Set 3
Spring 2017

Answers are to be submitted through *It's Learning*, by Feb. 28^{th}, 20:00.

1 Theory

Consider the simple grammar
$S \rightarrow XxXy|YyYx$
$X \rightarrow x$
$Y \rightarrow y$

- Show the LL(1) parsing table.
- Write out the steps in a top-down parse of the input 'xy', showing remaining input, and the state of the parse stack for each step.
- Write out the steps in a bottom-up parse of the input 'xy', showing remaining input, state of the parse stack, and the action taken for each step.

2 Programming

The VSL compiler in the provided archive ps3_skeleton.tgz is extended with a function 'simplify_tree' in tree.c; this function is called from main.c, after the initial syntax tree construction. Implement the function so that it traverses the syntax tree, and makes the following modifications:

2.1 Eliminate nodes of purely syntactic value

Delete nodes which can only ever have 1 child and no meaningful data, and associate their child directly with their parent.

2.2 Flatten list structures

Delete internal nodes of list structures, leaving only a parent node with a list type, and all list items as its children. Print list items can be associated directly with the print statement.

2.3 Resolve constant expressions

Compute the value of subtrees representing arithmetic with constants, and replace them with their value.