

TDT4205 Problem Set 3

Answers are to be submitted via Blackboard by March 6th.

1 Bottom-up parsing

Consider the following grammar:

$S \rightarrow T$

$S \rightarrow T + N$

$S \rightarrow T - N$

$T \rightarrow N$

$N \rightarrow n$

1.1 LR(0) automaton

Draw the LR(0) automaton for the grammar.

1.2 SLR parsing

Is the grammar SLR?

Justify your answer by presenting the SLR parsing table.

2 Tree simplification

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.