COL719 – Synthesis of Digital Systems
II Semester 2023-2024
Assignment 1: Data Flow Graph Construction
Submission Deadline: 5 Feb 2024 (11:55 PM)

Problem Statement

Given a specification in a simple language defined informally through the sample specification below, build an abstract syntax tree (AST), followed by a Data Flow Graph (DFG).

The tree corresponding to each statement should be as discussed in class, with '=' at its root, the LHS variable as its left child, and the RHS expression as its right child. The set of trees corresponding to the statements can be connected into a linked list.

The DFG should capture dependencies among the operations. Edges in the DFG should be annotated by the appropriate variable name, if relevant.

Assume sequential execution semantics for the specification.

Sample Specification:

a = b + c + d – 5
x = d * a
y = z + x

- All statements have one variable on the LHS, and any number of operations on the RHS.
- There can be any number of statements.
- Terms in an expression can be either variable or constant.
- Ignore types of variables.
- There are 4 operators: +, -, *, and /. Assume normal precedence rules for operators (i.e., * and / have higher priority than + and -).
- There are no conditionals, loops, and aggregate data types (arrays, pointers, etc.)

Input and Output:

Input: Text file with the specification

Output: Display the DFG