

# COM S 413/513: Homework 7 [written] - Program Dependency and Slicing

October 13, 2023

## Learning Objectives:

In this homework, students will

1. exercise and understand terminologies related to program dependency and slicing
2. understand the program slicing algorithm

## Instructions:

1. Total points: 29 pt
2. Early Deadline: Oct 18 (Wed) 11:59PM
3. Deadline: Oct 20 (Fri) 11:59PM
4. How to submit: Create a single PDF with answers and upload it to Canvas.

## Question:

(27 pt) Perform dependency analysis (manually) for the following function and answer the questions below:

```
0 int main() {
1     int n;
2     read(n);
3     if (n <= 5) {
4         n = 1;
5     }
6     int sum = 0;
7     int prod = 1;
8     int iter = 1;
9     while (iter < n) {
10        sum = sum + iter;
11        prod = prod * iter;
12        iter++;
13    }
14    int result = sum + prod;
15    return result;
16 }
```

1. (4 pt) Identify statement pairs that have a direct data dependency relation through definition and use. Use the line numbers to identify the statements.
2. (4 pt) Identify statement pairs that have a control dependency relation. Use the line numbers to identify the statements.
3. (4 pt) Construct a PDG for this function. Use the line numbers to represent statement nodes.

4. (4 pt) Are line 14 and line 8 dependent? Why? Are line 14 and line 4 dependent? Why?
5. (4 pt) Given the slicing criterion (14, **sum**), compute backward **static** slice.
6. (4 pt) Given a slicing criterion (15, **result**) and that input **n** is 6, compute backward **dynamic** slice using Algorithm one (slides 10–11) in the lecture slides.
7. (5 pt) Given that at line 2, untrusted input can be taken. Perform taint analysis for this function and report which variables are tainted.