

# Homework 5: Dataflow Analysis

Due Nov 9, 2011

Suppose we have the following C code.

```
float foo(float *arr, int size, float v)
{
    float cur[size], elem1, elem2, res;
    bool change;
    int i;
    i = 0; change=false;
    while (i < size) {
        elem1 = arr[i];
        elem2 = elem1 * elem1 / 2;
        if (elem2 != elem1) change = true;
        cur[i] = elem2;
        i = i + 1;
    }
    if (!change) { res = v; return res;}
    res = 0;
    for (i = 0; i < size; ++i)
        res = res + cur[i];
    return res;
}
```

1. Build control-flow graph for the given code.
2. Compute the set of live variables at the exit of each basic block. Note that you should treat each array (e.g., arr and cur) as a single collective variable, and any modification or use of any element of the array would qualify a definition or use of the whole array.
3. Convert the CFG into SSA form. Note when constructing SSA form, you can ignore arrays as they can be modified more than once; i.e., they are not part of the SSA form.