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CS591 L1

Final Project Proposal

We will be adapting one of the project ideas posted on Piazza. The idea will be:

Write a code transformer that transforms tail recursive functions to functions that use loops instead of recursion.

We had no idea what topic to choose, and the idea looked cool and interesting, thus we chose this idea. We also did some research into the idea of tail-end recursion versus loops (see link): https://stackoverflow.com/questions/660337/recursion-vs-loops. It would seem that loops are generally faster in the real-world (but they are comparable). The recursive solution to the same problem will be using the stack, this could potentially cause StackOverFlow. There are both advantages and disadvantages of each (tail-end recursion and use of a loop). From: https://hackernoon.com/recursion-vs-looping-in-python-9261442f70a5, we can also see that there are some cases where recursion would be better than loops and vice versa. Therefore it could be useful to be able to switch between the two approaches. That is the motivation of this project.

We will most likely use python and have this functionality be for python code. As for the methodology on doing this project, we definitely will need to walk and parse through another module and find function definitions, as there will only be recursive calls within a function itself. Also it should be a function that calls itself within the body of it, so we will walk through the ast and try to find as such, using the same methods as used in Project 2. We will also need to find if the recursive call is being done after everything else within the function (as we are looking for tail-end recursion). We can then figure out the for/while loop equivalent of the recursion and replace the body of the function with the for/while loop and then return the new code in a new file or edit the existing file. The relevancy to the course material lies within the methodologies we use to build this functionality. We will mainly utilize knowledge that we gained when doing

Project 2, using reflectivity and instrumentation in particular. This fits with the topic categories as: Program Analysis or Transformation. We will be effectively transforming another program that had tail-end recursion to have loops instead.