

## Scope of my Project

I have implemented all of the required parts of assignments PA1-PA4, and they seem to work pretty well. The only thing that doesn't work perfectly (to my knowledge) is the handling of source positions throughout the code. As a result, my error messages do not output anything about the source position of the corresponding error. I have not done any of the project extensions.

## Summary of Changes to Distributed Components

First, I added the following subclasses to the Reference class in PA3: LocalRef, MemberRef, ClassRef, ThisRef, and DeRef. I did this in order to make it easier for me to deal with references during the code generation in PA4. I then changed the visitor interface to implement visit methods for those corresponding new classes (In the process, I also had to modify the "ASTDisplay" class to take this into account, but that class doesn't actually print out these types of references).

I also tried to get my compiler to handle source positions correctly. To do this, I first changed my token scanner in the "Scanner" class to have a source position variable to keep track of where each token was. I also changed the "Token" class so that it also had a "SourcePosition" variable. Finally, I changed the parser in my "Parser" class to try and incorporate the corresponding source positions into each part of the AST (although I didn't get this to work perfectly).

Next, after I had started on PA4, I added a "RuntimeEntity" variable to the "Declaration" class in PA4. I did this in order to more easily keep track of the locations and types of different declarations in a program being compiled. I also edited my "TypeChecker" class to add special "unknown" runtime entities for the "System" class and its attributes. Additionally, I changed my "TypeChecker" from PA3 to not allow static references regardless of where they were located in a reference (even "in the middle").

In addition, I added the "numberOfVarDecls" feature to my "BlockStmt" class in order to keep track of how many variables were declared in a block statement (such as in a while loop). This was necessary in order to de-allocate them at the end of a block statement (and especially at the end of each iteration of a while loop). Lastly, I changed my "TypeChecker" from PA3 to allow for the "length" feature of arrays in PA4.

## Description of Test Cases

I don't have any test cases, as I did not do any of the project extensions.