Photran Automated Refactoring of Client Code to Extract Procedures
Estayvaine Bragg, University of Illinois at Urbana-Champaign
ADVISOR: Ralph Johnson

Background

• Photran is a refactoring plug-in for the Eclipse IDE.
• Automated Refactoring is an important tool to help update existing code because it saves significant time as opposed to manual changing of code.
• Photran is an open-source project. Its users help to update it by reporting bugs and fixing current refactorings and adding new features.

Goals

• Address a bug reported by one of Photran’s users.
• Fix the bug that the Extract Procedure refactoring has when performed on code that deals with kind.

Before
subroutine foo(x, i)
implicit none
real*8 :: x
integer :: i
real(kind=4) :: y
real(kind=4) :: z
real :: w

y = x**2
z = x * y
w = z - y
print*, w
end subroutine foo

After
subroutine bar(w, x, y, z)
implicit none
real :: w
real :: x
real :: y
real :: z

y = x**2
z = x * y
w = z - y
end subroutine bar

Research Plan

• Analyze the structure of the Abstract Syntax Tree built by example code.
• Fix and test the Extract Procedure code and ensure its correctness by Junit testing.
• Ensure that none of the other features of the plug-in were broken in any manner.

Current Research Results

• The error was found to be in the Extract Procedure code. Kind was never checked for within the code.
• The value given to kind was never assigned back to the kind storage during the refactoring procedure.
• The node dedicated to kind within the tree was recognized; however, the information needed was in the form of a token that requires more work.

Fundamental Questions/Challenges

• Photran is a very large plug-in with approximately 3 million lines of code, so understanding the system was the first challenge.
• When the arithmetic statements are selected in the Fortran code from above, the result is the code on the left.
• Why is kind forgotten in this refactoring?
• Is there an error building the Abstract Syntax Tree, or is there an error with the checking within the Extract Procedure code?

Related Work/Interaction with Other Projects

Jeffrey L. Overbey, A Toolkit For Constructing Refactoring Engines, Ph.D. dissertation, University of Illinois at Urbana-Champaign, 2011:
https://www.ideals.illinois.edu/bitstream/handle/2142/29774/Overbey_Jeffrey.pdf?sequence=1