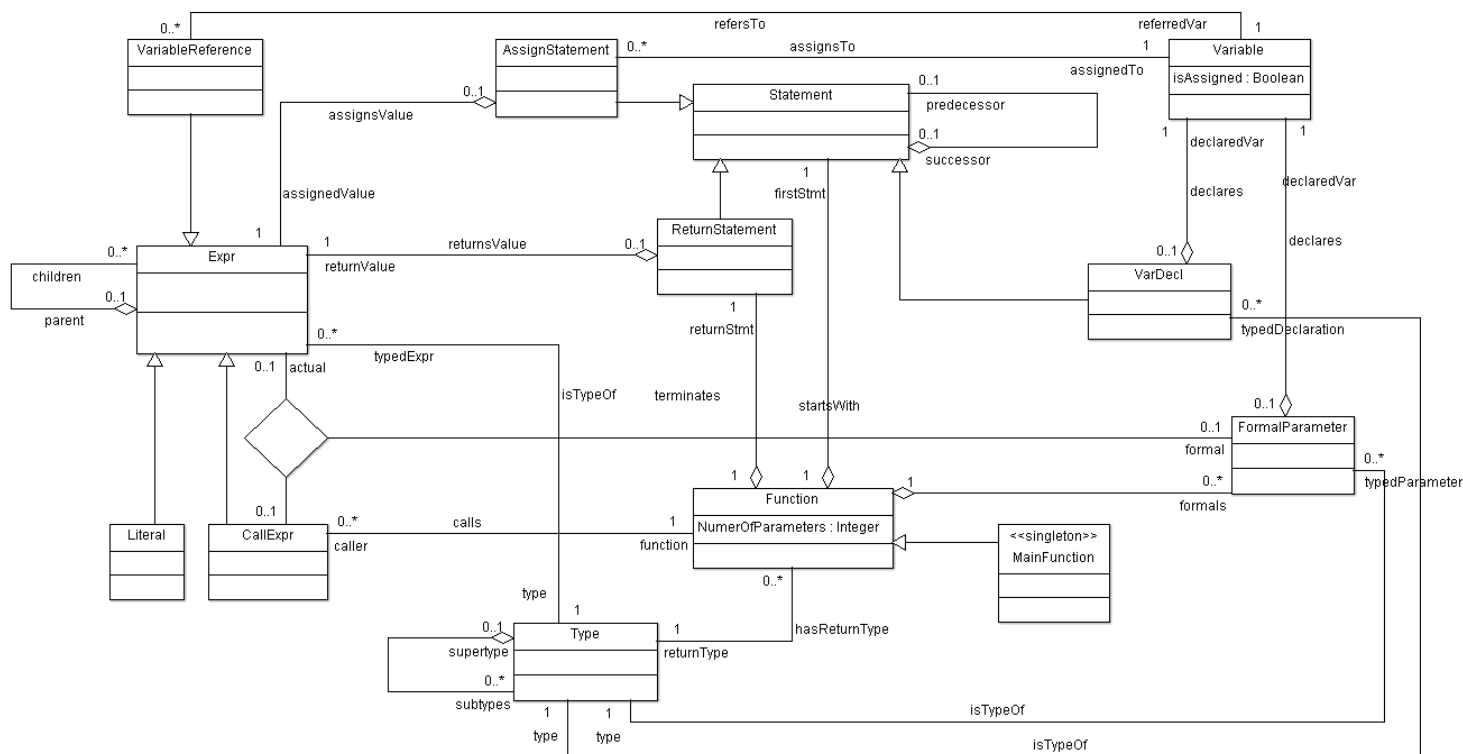


# ETH SAE Project 1 - Sherlock

Source code and XML files are in `hand-in.zip`.

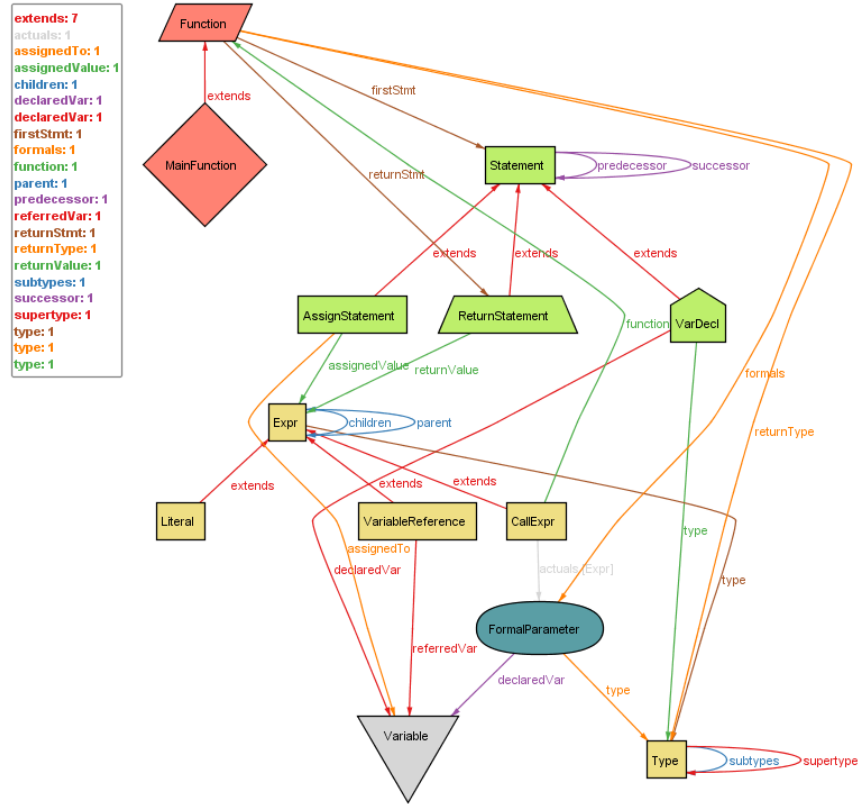
## UML class diagram



## Elements that are not encodable in the UML class diagram

- The first statement has no predecessor.
- The return statement has no successor.
- Actual parameters are mapped to the formal parameters of the function our expression calls.
- A return statement terminates the execution of the function body.
- A function may not contain unreachable statements.
- Recursion is not allowed.
- The call expressions are in parent-child relation with the actual parameters.
- There is one main function that takes no parameters.
- All functions are transitively called from the main function.
- A variable has to be declared at least once. (We only modelled it has to be declared at most once, but we want to say that variables are declared exactly once.)
- Variables must be declared in the same function before the first use such as the first assignment.
- Variables can only be used in expressions after they have been assigned to.
- We do not allow dead variables or dead assignments.
- There are no assignments to parameters.
- Typing rules for assignments, function calls and return statements.

## Alloy model from task B

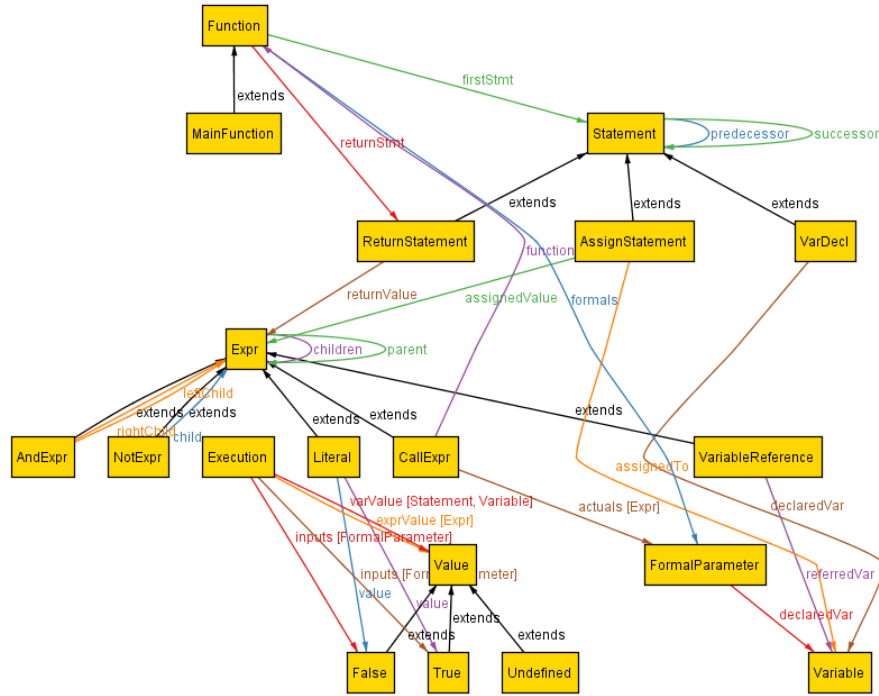


## Elements that are not encodable in the Alloy model for task B

- A return statement terminates the execution of the function body. (This is not a static constraint.)
- A function may not contain unreachable statements.

## Alloy model from task D

extends: 12  
 actuals: 1  
 assignedTo: 1  
 assignedValue: 1  
 child: 1  
 children: 1  
 declaredVar: 1  
 declaredVar: 1  
 exprValue: 1  
 firstStmt: 1  
 formals: 1  
 function: 1  
 inputs: 1  
 inputs: 1  
 leftChild: 1  
 parent: 1  
 predecessor: 1  
 referredVar: 1  
 returnStmt: 1  
 returnValue: 1  
 rightChild: 1  
 successor: 1  
 value: 1  
 value: 1  
 varValue: 1



## Instances that are not feasible in task C

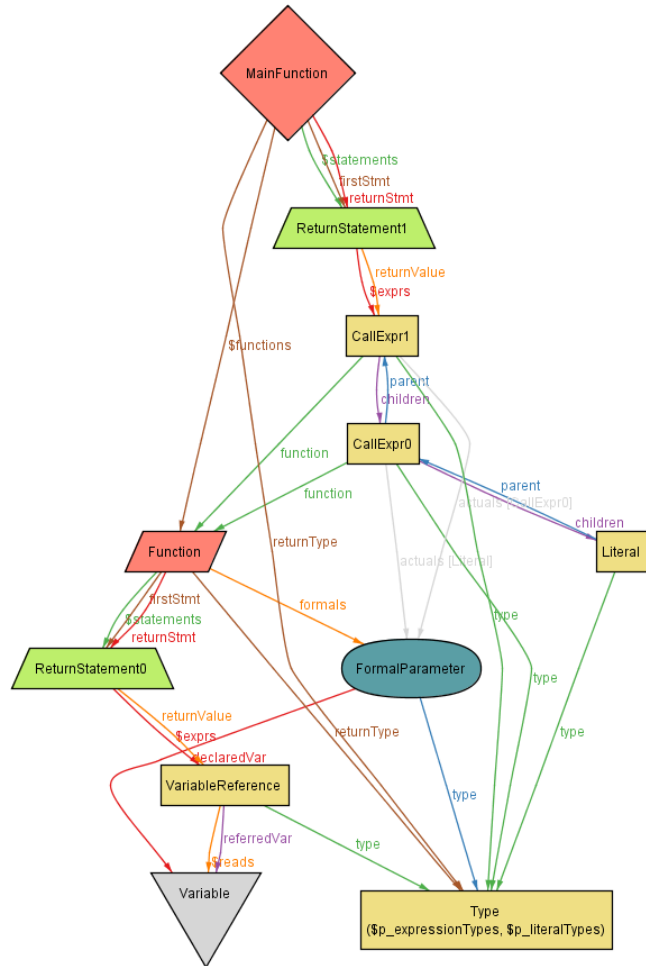
- Instance 1 is not feasible. We would need two function calls from the main function to itself. However, the LINEAR language does not allow recursion.
- Instance 5 is not feasible since it is not possible to have incomparable types at all due to the restricted set of expressions the language provides.

## Image exports from task C

(We only show one screen per generated instance.)

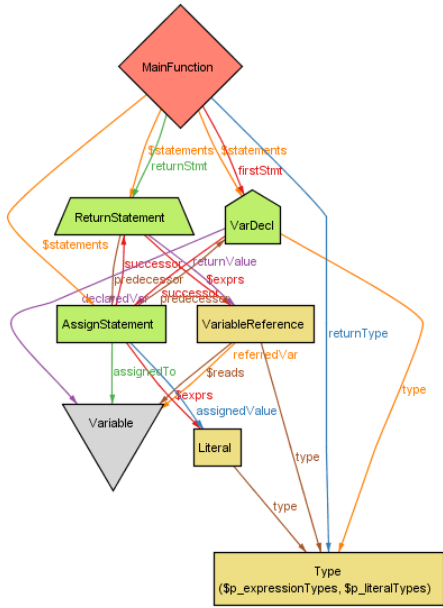
### Instance 2

\$exprs: 2  
\$functions: 1  
\$reads: 1  
\$statements: 2  
actuals: 2  
children: 2  
declaredVar: 1  
firstStmt: 2  
formals: 1  
function: 2  
parent: 2  
referredVar: 1  
returnStmt: 2  
returnType: 2  
returnValue: 2  
type: 4  
type: 1



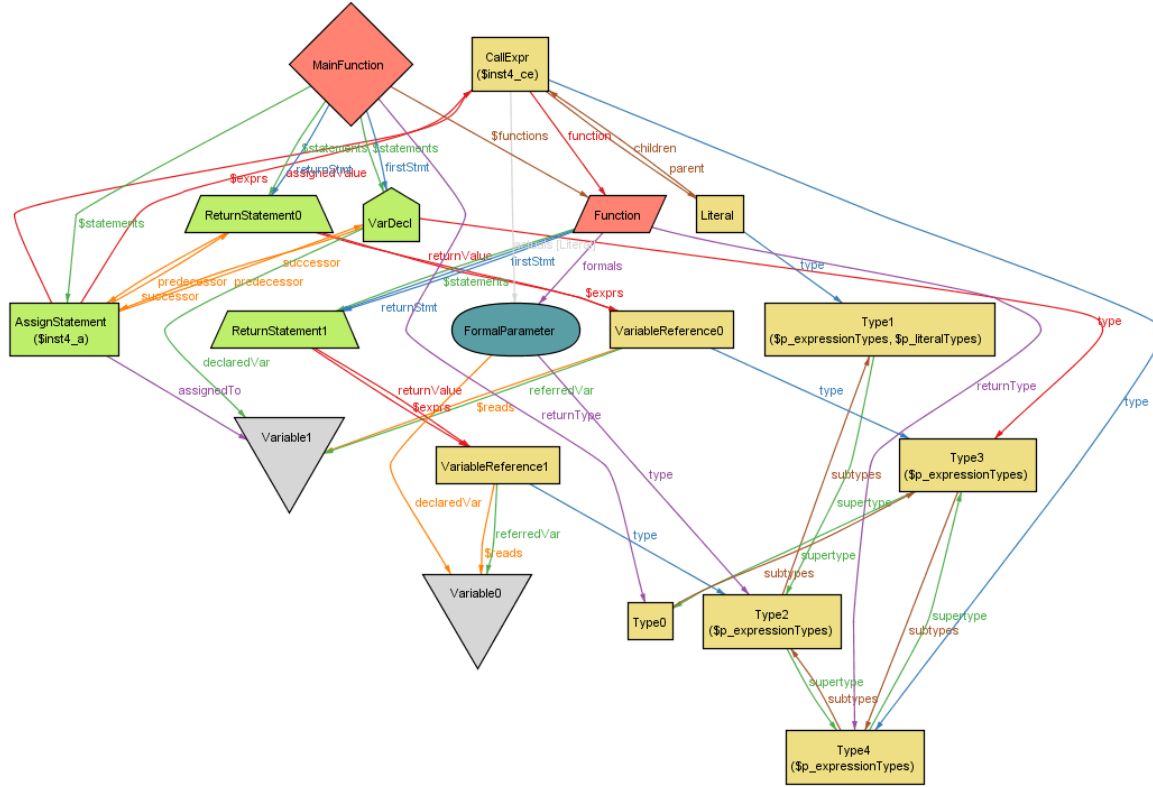
### Instance 3

\$exprs: 2  
\$reads: 1  
\$statements: 3  
assignedTo: 1  
assignedValue: 1  
declaredVar: 1  
firstStmt: 1  
predecessor: 2  
referredVar: 1  
returnStmt: 1  
returnType: 1  
returnValue: 1  
successor: 2  
type: 2  
type: 1



## Instance 4

\$exprs: 3  
 \$functions: 1  
 \$reads: 2  
 \$statements: 4  
 actuals: 1  
 assignedTo: 1  
 assignedValue: 1  
 children: 1  
 declaredVar: 1  
 declaredVar: 1  
 firstStmt: 2  
 formal: 1  
 function: 1  
 parent: 1  
 predecessor: 2  
 referredVar: 2  
 returnStmt: 2  
 returnType: 2  
 returnValue: 2  
 subtypes: 4  
 successor: 2  
 supertype: 4  
 type: 4  
 type: 1  
 type: 1



Instances that are not feasible in task E

(There are no infeasible instances.)

origin/master

Image exports from task E

(We only show one screen per generated instance.)

Instance 1

\$exprs: 1

\$reads: 4

\$statements: 1

children: 2

declaredVar: 2

exprValue: 12

firstStmt: 1

formals: 2

inputs: 4

inputs: 4

leftChild: 1

parent: 2

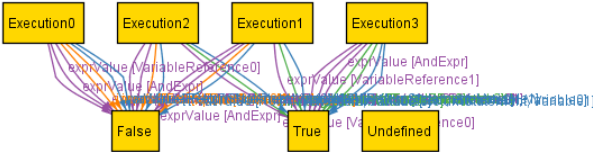
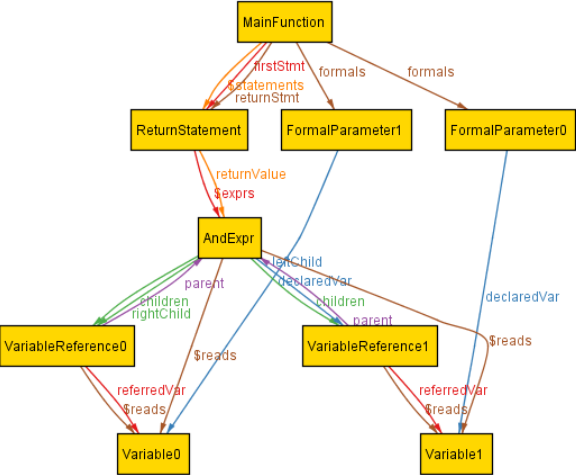
referredVar: 2

returnStmt: 1

returnValue: 1

rightChild: 1

varValue: 8



Instance 2

\$exprs: 1

\$reads: 6

\$statements: 1

child: 1

children: 3

declaredVar: 2

exprValue: 16

firstStmt: 1

formals: 2

inputs: 4

inputs: 4

leftChild: 1

parent: 3

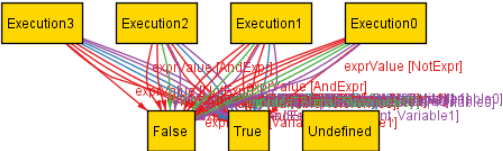
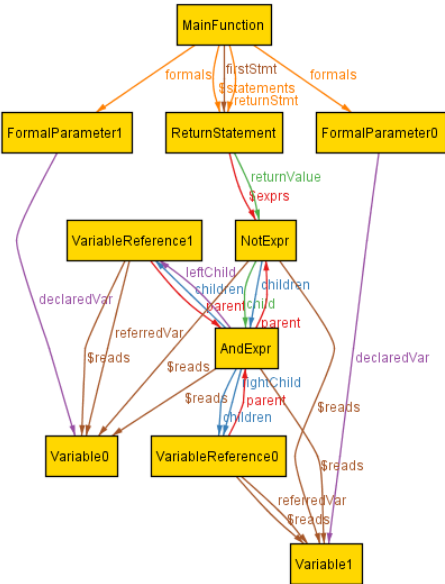
referredVar: 2

returnStmt: 1

returnValue: 1

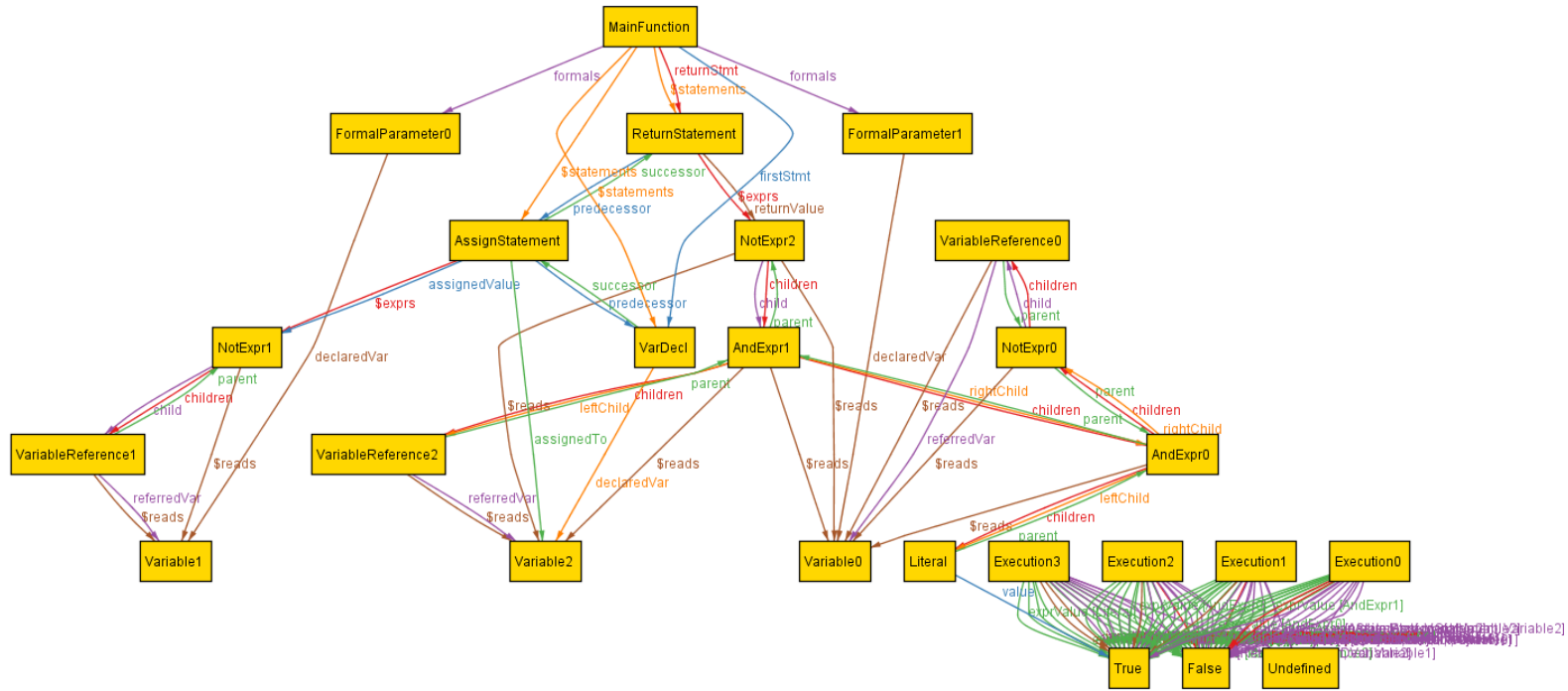
rightChild: 1

varValue: 8



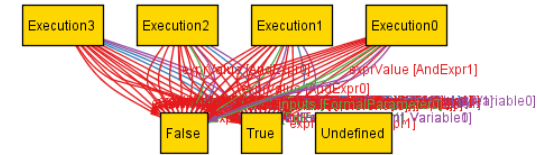
### Instance 3

\$exprs: 2  
 \$reads: 10  
 \$statements: 3  
 assignedTo: 1  
 assignedValue: 1  
 child: 3  
 children: 7  
 declaredVar: 2  
 declaredVar: 1  
 exprValue: 36  
 firstStmt: 1  
 formals: 2  
 inputs: 4  
 inputs: 4  
 leftChild: 2  
 parent: 7  
 predecessor: 2  
 predecessor: 3  
 referredVar: 3  
 returnStmt: 1  
 returnValue: 1  
 rightChild: 2  
 successor: 2  
 value: 1  
 varValue: 32





```
$exprs: 1
$reads: 16
$statements: 1
child: 4
children: 10
declaredVar: 2
exprValue: 44
firstStmt: 1
formals: 2
inputs: 4
inputs: 4
leftChild: 3
parent: 10
referredVar: 4
returnStmt: 1
returnValue: 1
rightChild: 3
varValue: 8
```



```
$exprs: 4
$functions: 2
$reads: 13
$statements: 5
actuals: 3
assignedTo: 1
assignedValue: 1
child: 1
children: 6
declaredVar: 5
declaredVar: 1
expr Value: 40
firstStmt: 3
formals: 5
function: 2
inputs: 4
inputs: 4
leftChild: 1
parent: 6
predecessor: 2
referredVar: 6
returnStmt: 3
returnValue: 3
rightChild: 1
successor: 2
varValue: 46
```

