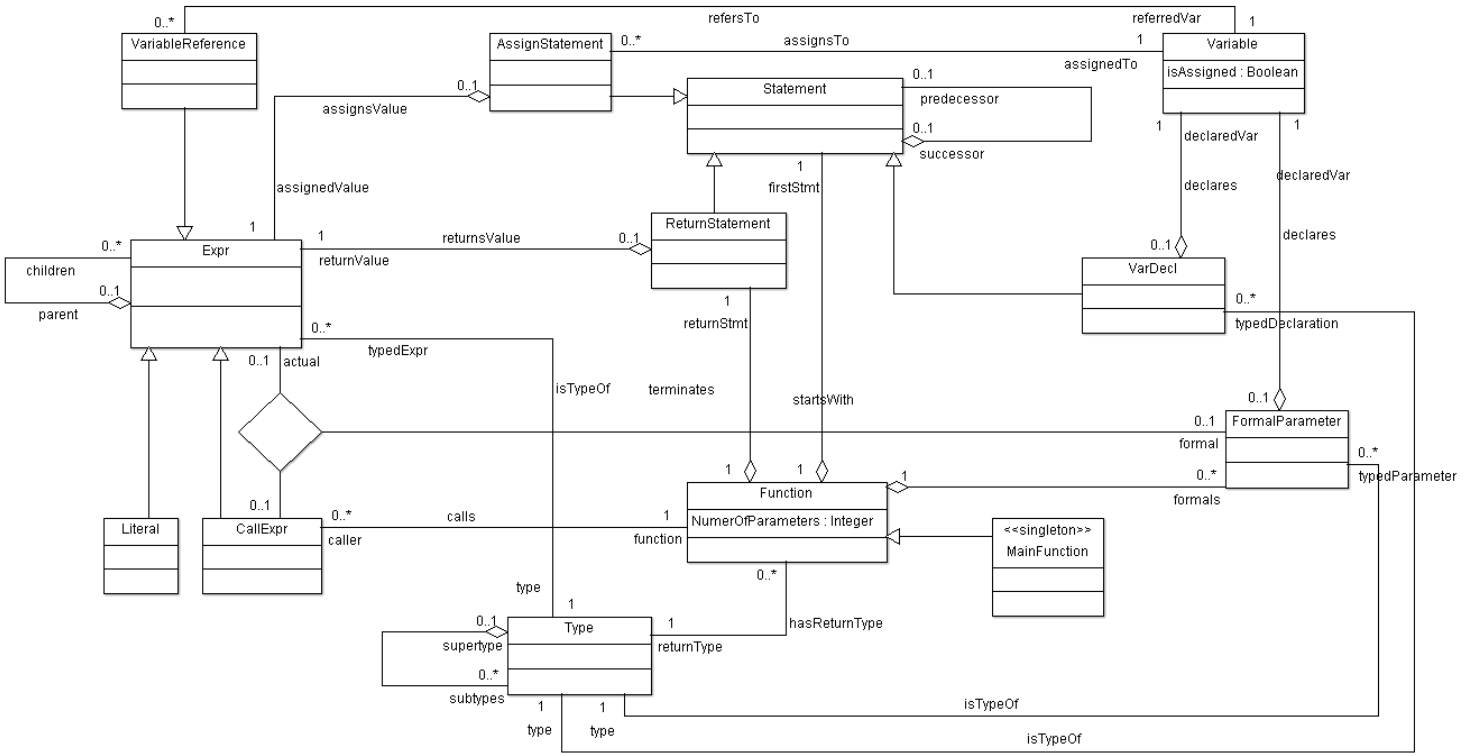
ETH SAE Project 1 - Sherlock

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

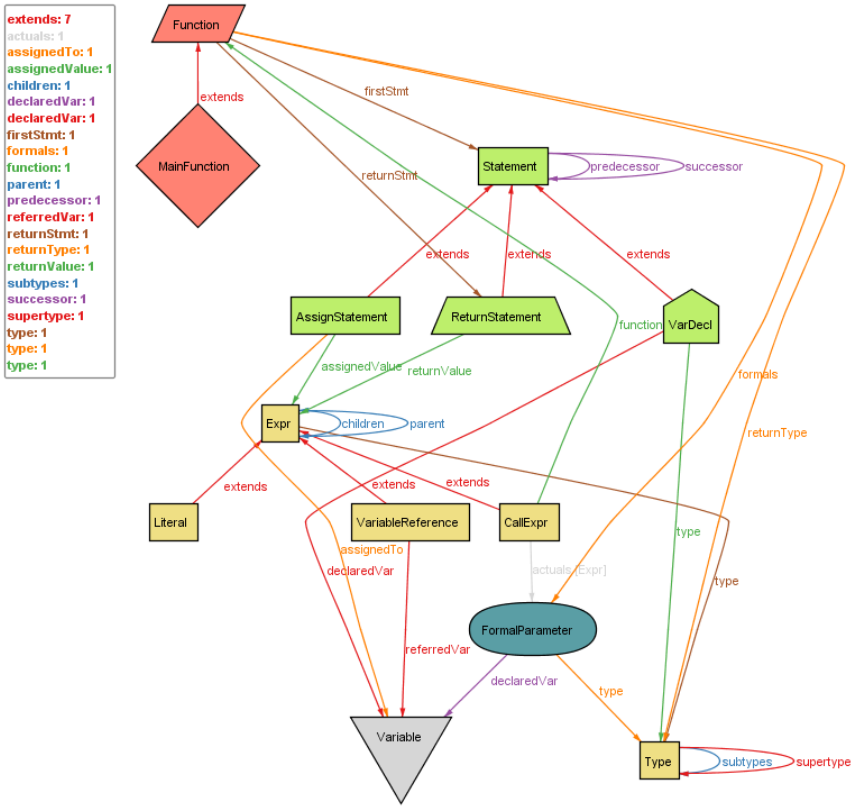
UML class diagram



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 is 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.

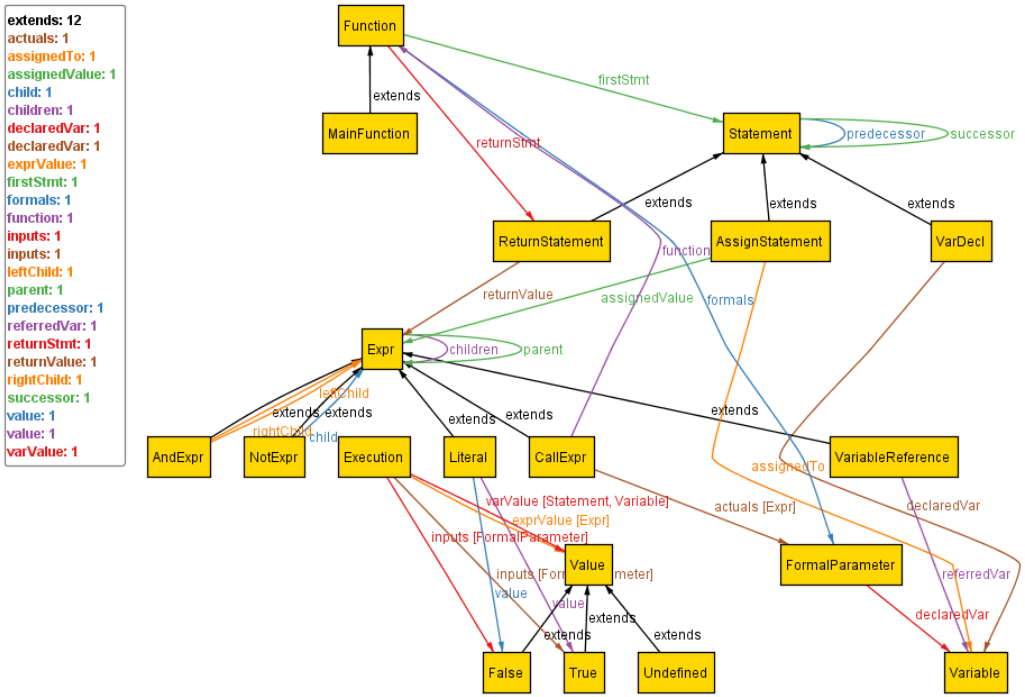
Alloy model from task B



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



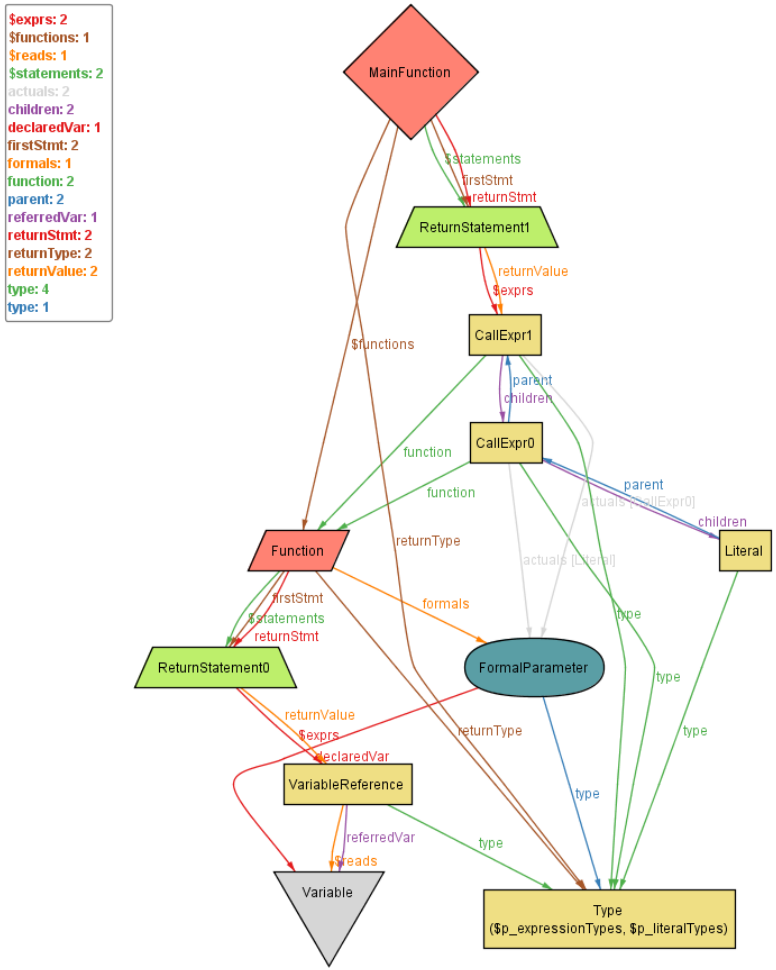
Instances that are not feasible in task C

- 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.

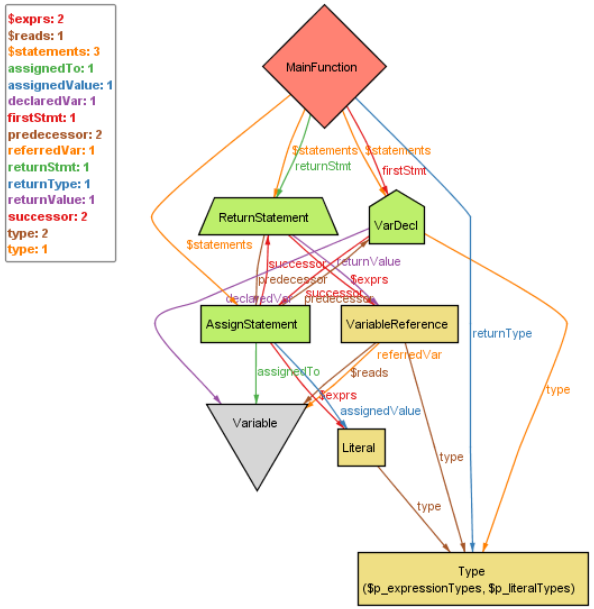
Image exports from task C

(We only show one screen per generated instance.)

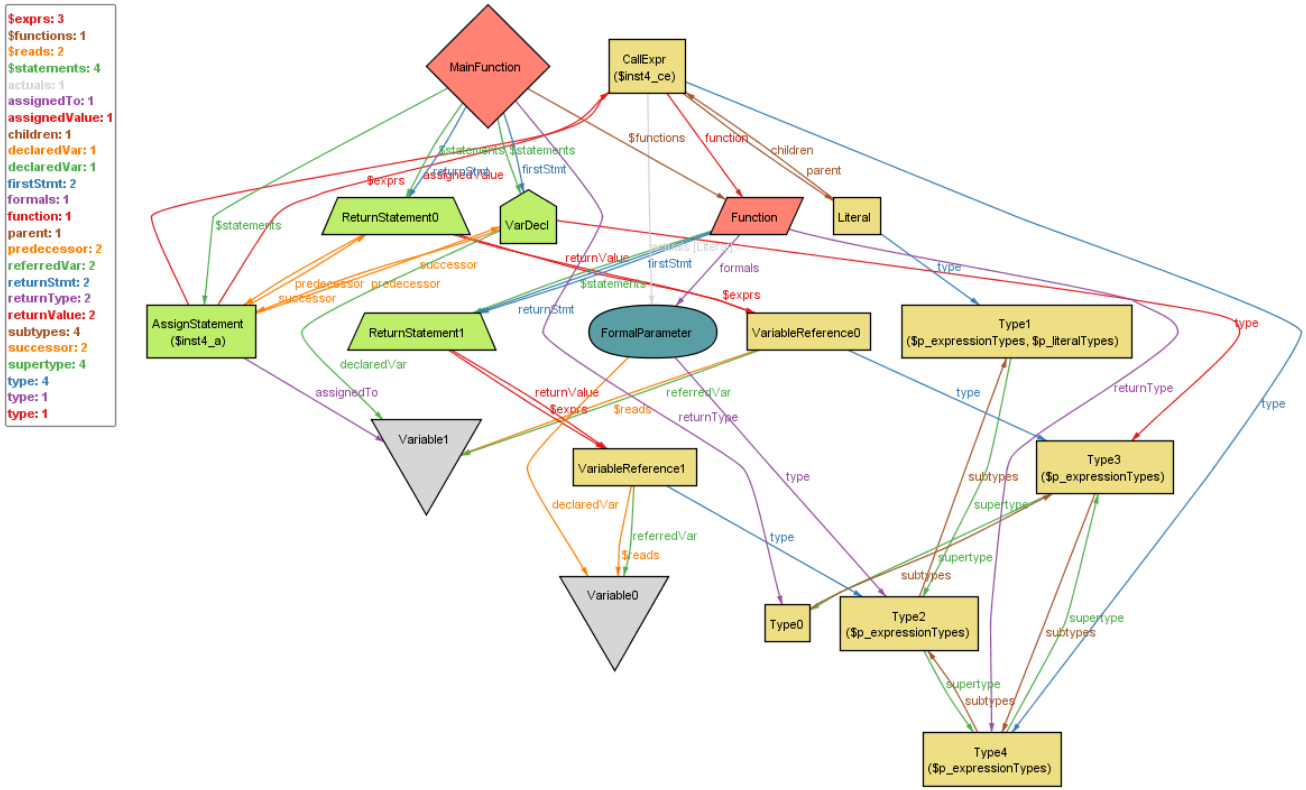
Instance 2



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
MainFunction
$statements
returnStmt
$statements
firstStmt
ReturnStatement
VarDecl
$statements
successor
returnValue
predecessor
$exprs
declaredVar
successor
predecessor
AssignStatement
VariableReference
returnType
referredVar
assignedTo
$reads
$exprs
assignedValue
type
Variable
Literal
type
type
Type
($p_expressionTypes, $p_literalTypes)

Instance 4


$exprs: 3
$functions: 1
$reads: 2
$statements: 4
actuals: 1
assignedTo: 1
assignedValue: 1
children: 1
declaredVar: 1
declaredVar: 1
firstStmt: 2
formals: 1
function: 1
parent: 1
predecessor: 2
referredVar: 2
returnStmt: 2
returnType: 2
returnValue: 2
subtypes: 4
successor: 2
supertype: 4
type: 4
type: 1
type: 1
MainFunction
CallExpr ($inst4_ce)
ReturnStatement0
VarDecl
Function
Literal
AssignStatement ($inst4_a)
ReturnStatement1
FormalParameter
VariableReference0
Type1 ($p_expressionTypes, $p_literalTypes)
Variable1
VariableReference1
Type3 ($p_expressionTypes)
Variable0
Type0
Type2 ($p_expressionTypes)
Type4 ($p_expressionTypes)

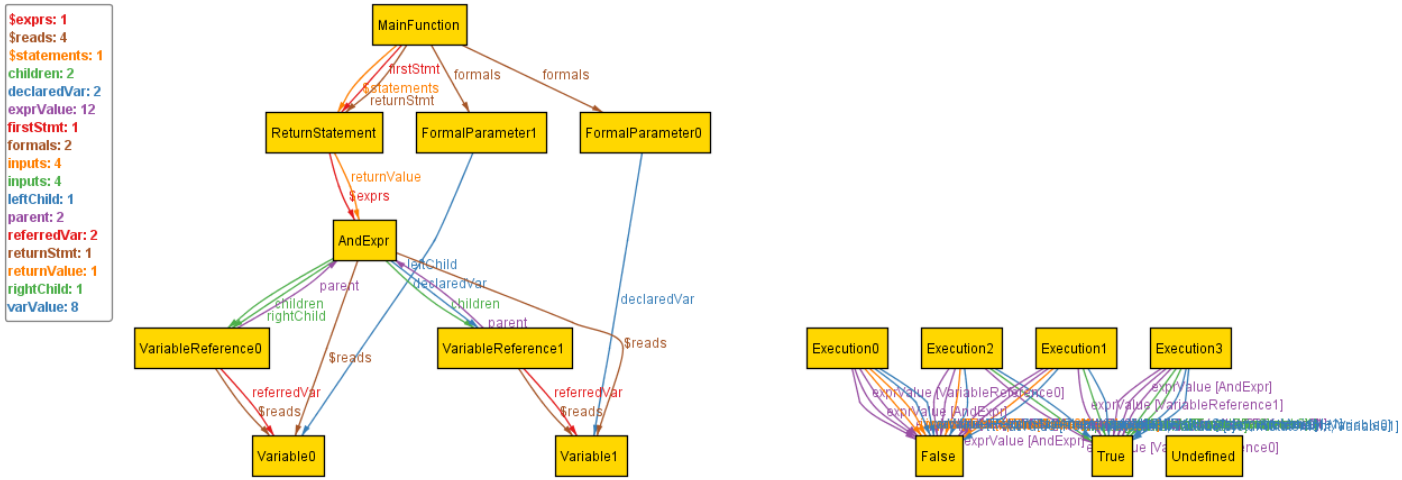
Instances that are not feasible in task E

(There are no infeasible instances.)

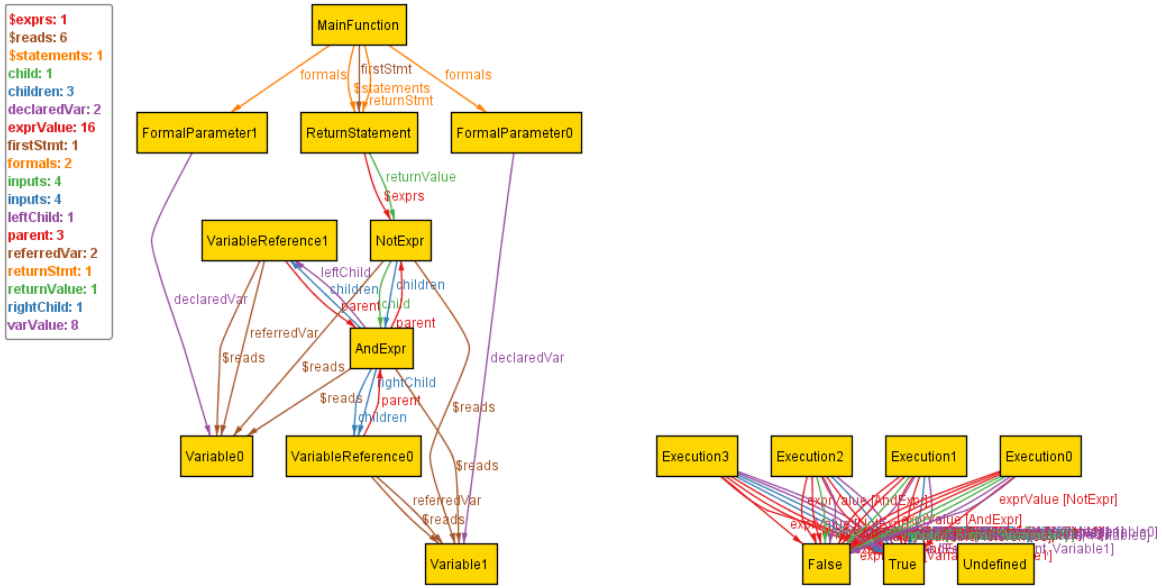
Image exports from task E

(We only show one screen per generated instance.)

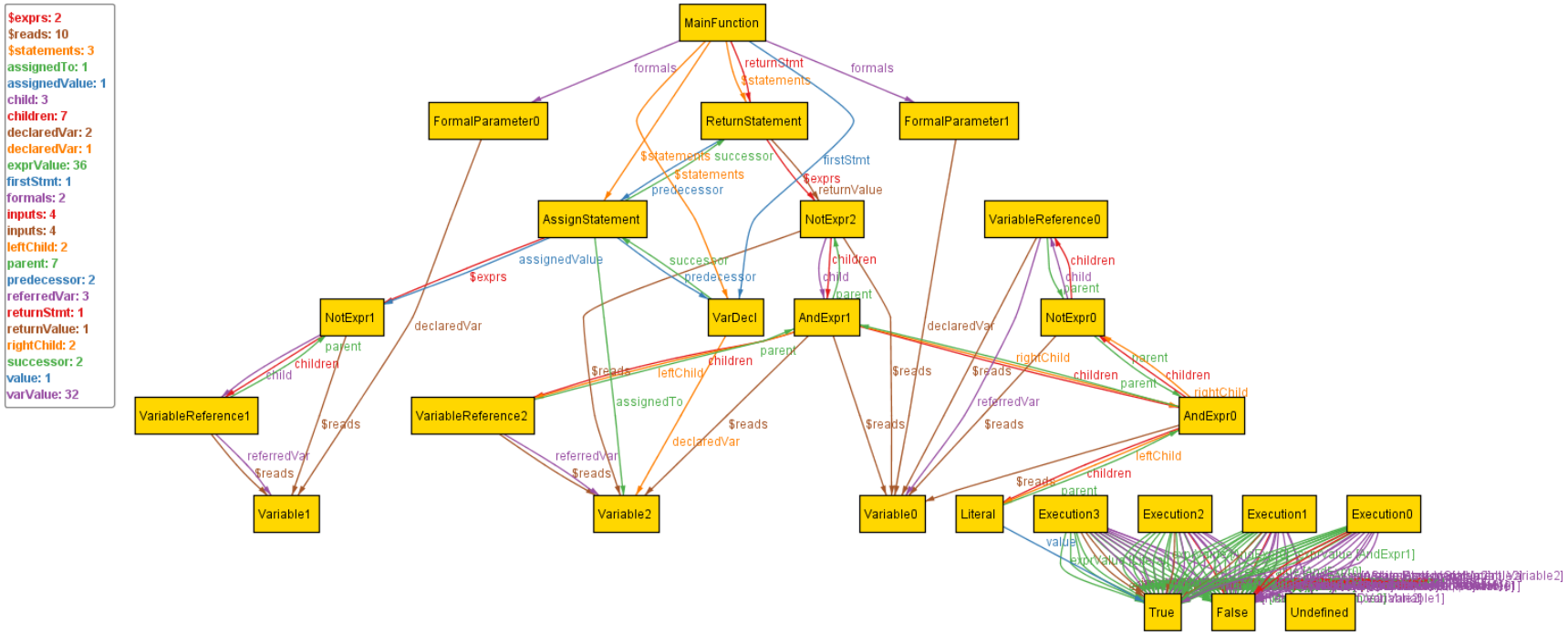
Instance 1



Instance 2

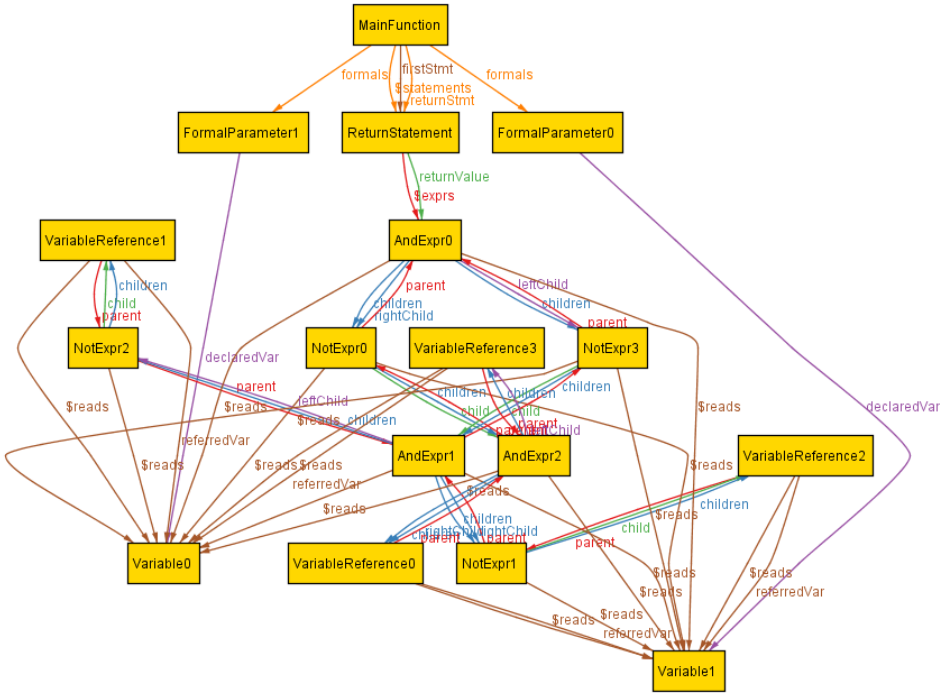


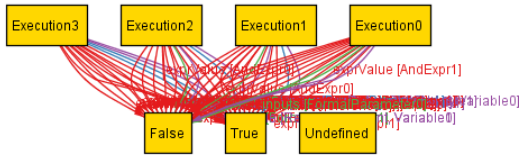
Instance 3


$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
referredVar: 3
returnStmt: 1
returnValue: 1
rightChild: 2
successor: 2
value: 1
varValue: 32
MainFunction
FormalParameter0
ReturnStatement
FormalParameter1
AssignStatement
NotExpr2
VariableReference0
NotExpr1
VarDecl
AndExpr1
NotExpr0
VariableReference1
VariableReference2
AndExpr0
Variable1
Variable2
Variable0
Literal
Execution3
Execution2
Execution1
Execution0
True
False
Undefined
formals
returnStmt
$statements
$statements successor
predecessor
firstStmt
$exprs
returnValue
assignedValue
$exprs
successor
predecessor
children
child
parent
declaredVar
$reads
leftChild
rightChild
assignedTo
referredVar
value

Instance 4

$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





Instance 5

$exprs: 4
$functions: 2
$reads: 13
$statements: 5
actuals: 3
assignedTo: 1
assignedValue: 1
child: 1
children: 6
declaredVar: 5
declaredVar: 1
exprValue: 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