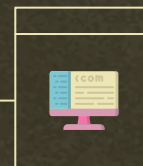
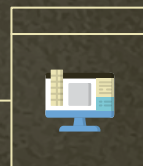
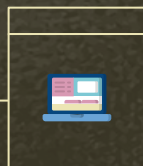


COMPILERS CONSTRUCTION

Report 3 - Semantic Analysis &
Program Optimization



COMPILUL'KI



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Technology stack



Project: Object-Oriented

Target platform: LLVM

Implementation lang/tool: C++,
handwritten parser, CMake
to build the project

Target language: LLVM
bit-code





Semantic Checks

that do not modify AST

Undeclared identifiers using

```
Program: Main(1.1, 1.2)

class Main is
  this() is
    var a : Integer(5)
    c := a.Plus(b)
  end
end
```

```
(venv) [02:09:46] [~/CLionProjects/IU_Compilulki_Compiler] >>> cmake-build-debug/compilulki examples/symantic_checks/undeclared_var.olang
Variable 'c' used before declaration at line: 7 column: 11
libc++abi: terminating due to uncaught exception of type std::runtime_error: Variable 'c' used before declaration at line: 7 column: 11
[1] 59036 abort      cmake-build-debug/compilulki examples/symantic_checks/undeclared_var.olang
```

Undeclared identifiers using

```
Program: Main(1.1, 1.2)

class Main is
  this() is
    var a : Integer
    a := Integer(10)
    a.error()
  end
end
```

```
(venv) [02:17:07] [~/CLionProjects/IU_Compilulki_Compiler] >>> cmake-build-debug/compilulki examples/symantic_checks/undeclared_method.olang
libc++abi: terminating due to uncaught exception of type std::runtime_error: Identifier error is not declared
[1] 64332 abort      cmake-build-debug/compilulki examples/symantic_checks/undeclared_method.olang
```


Undeclared identifiers using

```
Program: Main(1.1, 1.2)
```

```
class Main is
```

```
  this() is
```

```
    var a : Error(5)
```

```
  end
```

```
end
```

```
(venv) [02:13:36] [~/CLionProjects/IU_Compilulki_Compiler] >>> cmake-build-debug/compilulki examples/symantic_checks/undeclared_var.olang
libc++abi: terminating due to uncaught exception of type std::runtime_error: Class 'Error' used before declaration at line: 6 column: 22
[1] 61824 abort      cmake-build-debug/compilulki examples/symantic_checks/undeclared_var.olang
```

Already declared identifiers re-declarations

```
Program: Main()

class Main is
  this() is

    var a : Integer
    a := Integer(10)

    var a: Real
    a := Real(10.0)
  end
end
```

```
(venv) [02:15:00] [~/CLionProjects/IU_Compilulki_Compiler] >>> cmake-build-debug/compilulki examples/errors/redeclaration.olang
libc++abi: terminating due to uncaught exception of type std::runtime_error: Variable 'a' is already declared in this scope at line: 9 column: 13
[1] 62815 abort      cmake-build-debug/compilulki examples/errors/redeclaration.olang
```


Already declared identifiers re-declarations

```
Program: Main()

class Main is
  this() is
    var a : Integer
    a := Integer(10)
  end
end

class Main is
  this() is
    var a : Integer
    a := Integer(10)
  end
end
```

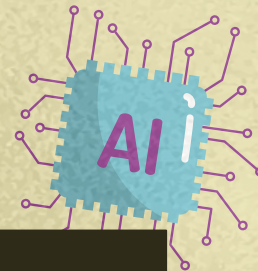
```
(venv) [02:19:04] [~/CLionProjects/IU_Compilulki_Compiler] >>> cmake-build-debug/compilulki examples/errors/class_redeclaration.olang
libc++abi: terminating due to uncaught exception of type std::runtime_error: Class 'Main' is already declared in this scope at line: 11 column: 12
[1] 65753 abort      cmake-build-debug/compilulki examples/errors/class_redeclaration.olang
```

Method return type check

```
Program: Main(1.1, 1.2)
```

```
class Main is
    method returnInteger() : Integer is
        var a : Real
        return a
    end
end
```

```
(venv) [12:53:03] [~/CLionProjects/IU_Compilulki_Compiler] >>> cmake-build-debug/compilulki examples/errors/primary_type_error.olang
libc++abi: terminating due to uncaught exception of type std::runtime_error: Method returnInteger is of type Integer but is being assigned to type Real at line: 8 column: 5
[1] 35590 abort      cmake-build-debug/compilulki examples/errors/primary_type_error.olang
(venv) [12:54:04] [~/CLionProjects/IU_Compilulki_Compiler] >>> 
```

Optimizations

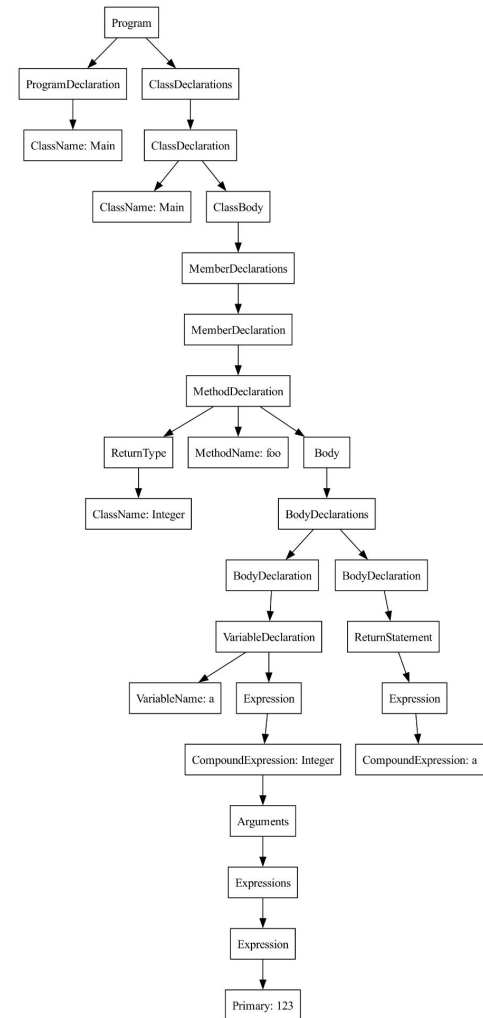
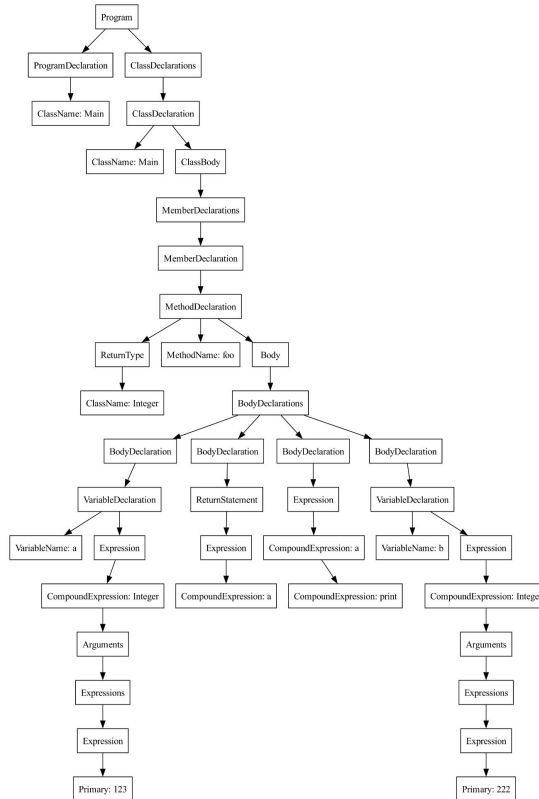
that do modify AST



Unreachable code erasing

Program: Main

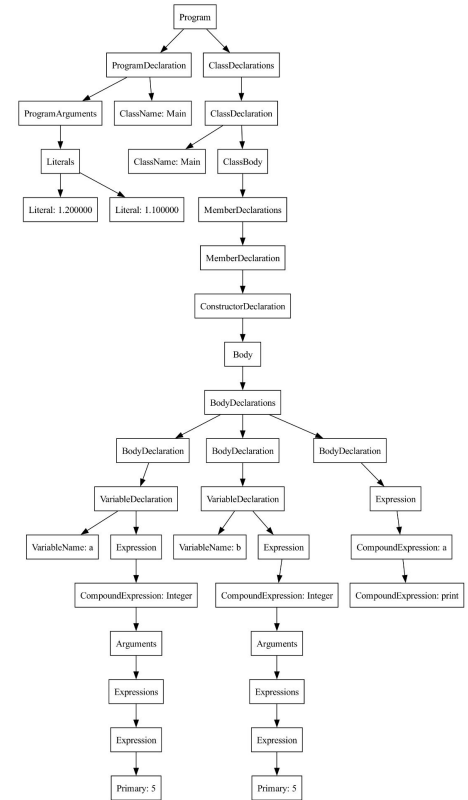
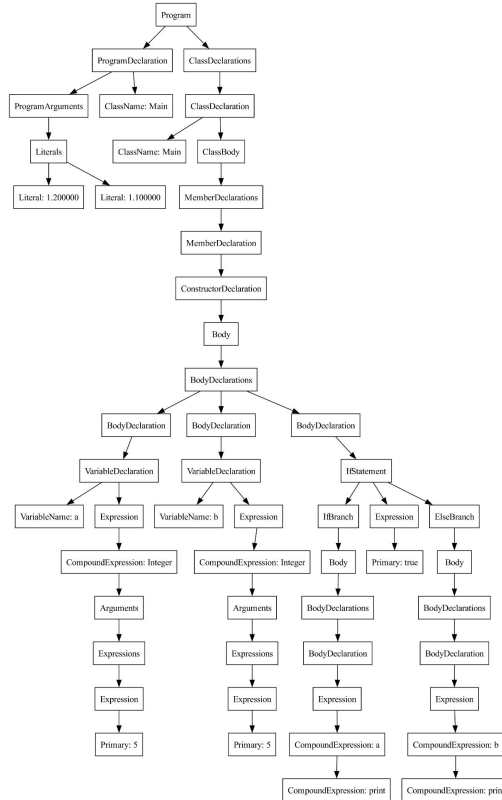
```
class Main is
  method foo(): Integer is
    var a : Integer(123)
    return a
  a.print()
  var b : Integer(222)
end
end
```



If-else constant conditions simplification

Program: Main(1.1, 1.2)

```
class Main is
  this() is
    var a : Integer(5)
    var b : Integer(5)
    if true then
      a.print()
    else
      b.print()
    end
  end
end
```

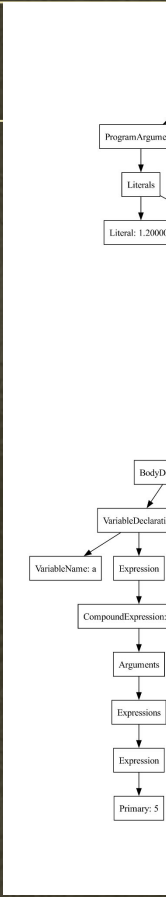


Unused variables deletion

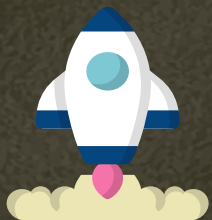
Program: Main(1.1, 1.2)

```
class Main is
  this() is
    var a : Integer(5)
    var b : Integer(10)
    var c : Integer(15)
    a := a.Plus(b)
    b.print()
  end
end
```

```
(venv) [01:58:46] [~/CLionProjects/IU_Compilulki_Compiler] >>> cmake-build-debug/compilulki examples/optimizations/unused_variable.olang --debug
{infile='examples/optimizations/unused_variable.olang'; outfile='examples/optimizations/unused_variable.o'; debug=1; help=0}
Lexical analyzer writing to "examples/optimizations/unused_variable.lexer"
Writing to "examples/optimizations/unused_variable.syntax"
Unused variables in this scope: c
Unused variable: c
Writing to "examples/optimizations/unused_variable.semantics"
```

Examples



GitHub



THANKS!

