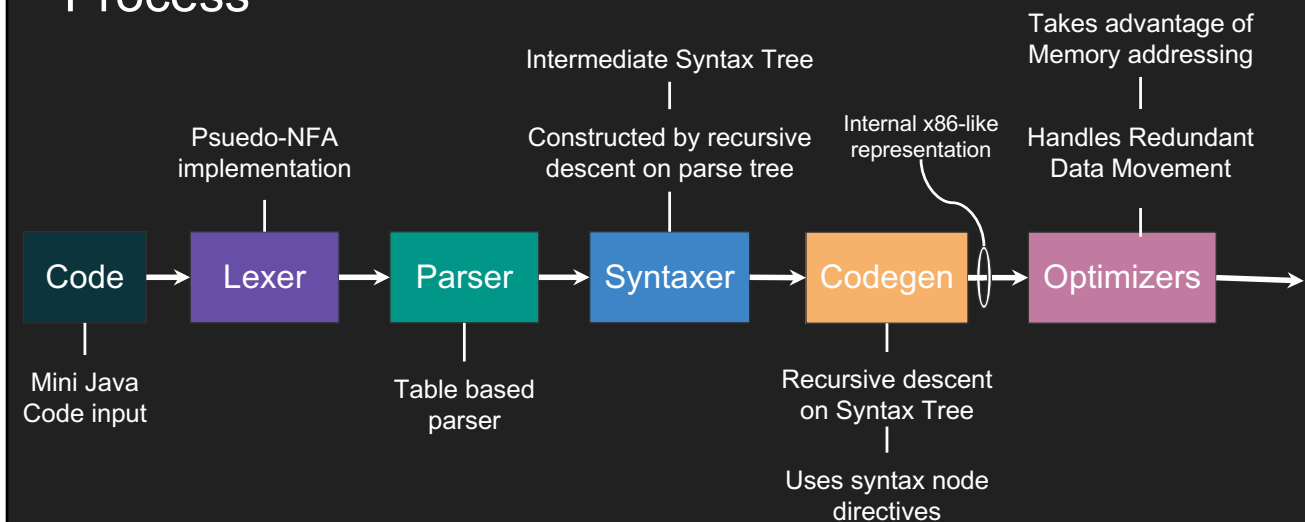


# Compiler

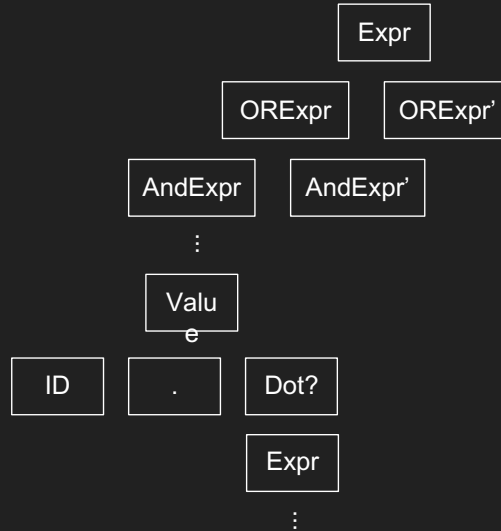
## Process



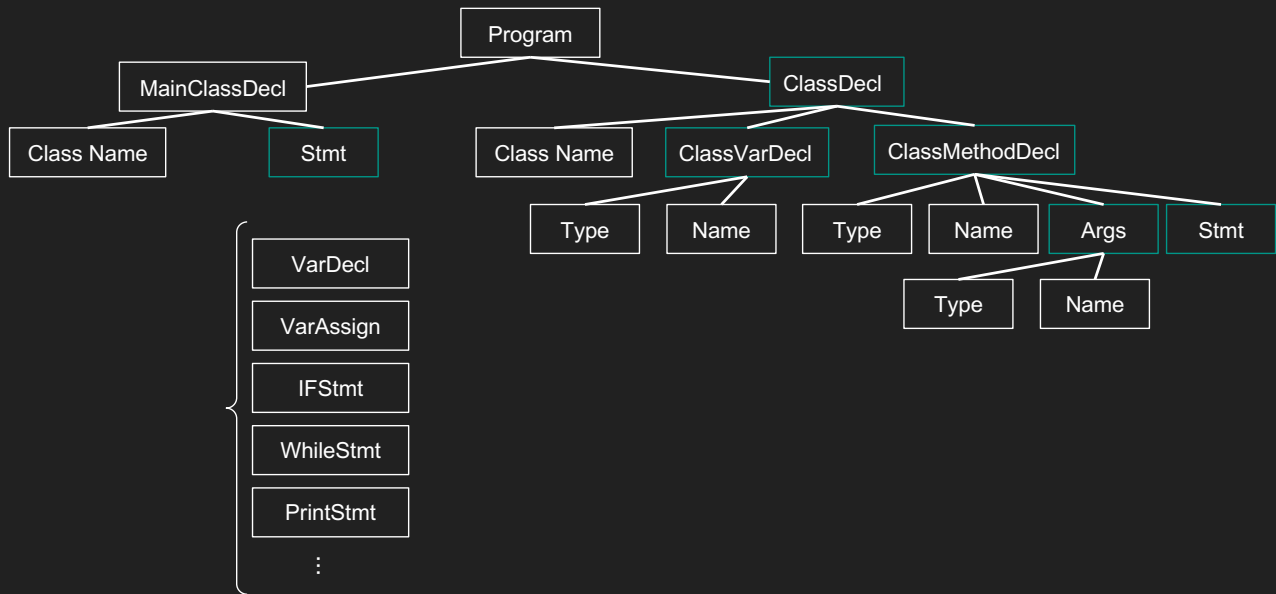
# Parse Tree: Unusable for Generation

```

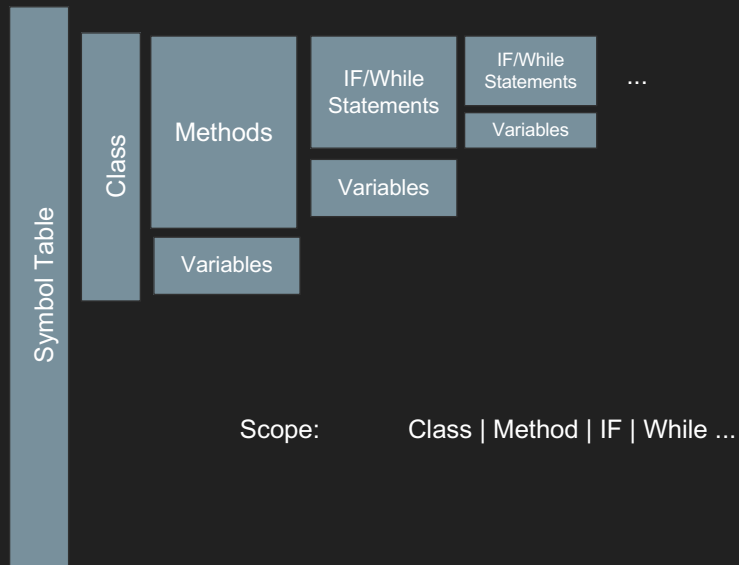
Expr
  OrOperand
  AndOperand
  EqualityOperand
  RelOperand
  AddOperand
  Value
  T: new
  NewWhat
  T: ID : BS
  T: (
  T: )
  ValuePrime
  T: .
  DotWhat
  T: ID : Start
  T: (
  ExprList
  Expr
  OrOperand
  AndOperand
  EqualityOperand
  RelOperand
  AddOperand
  Value
  T: Integer : 20
  AddOperandPrime
  RelOperandPrime
  EqualityOperandPrime
  AndOperandPrime
  OrOperandPrime
  ExprPrime
  ExprListPrime
  T: )
  ValuePrime
  AddOperandPrime
  RelOperandPrime
  EqualityOperandPrime
  AndOperandPrime
  OrOperandPrime
  ExprPrime
  
```



# Syntax Tree:



## Symbol table



## Code considerations

- Generates code in the way x86 originally expects
  - Expressions generate code by leaving resulting value on EAX
- Local variables live on stack
- Class variables live on heap
- Arrays live on heap

## Code Generation: Example

Array Variable Assign Statement:

```

      ID [Expr] = Expr;
varName arrRef value

```

```

Add CodeGen of arrRef
Push EAX
Add CodeGen of value
Pop into ECX
Add new MovOp varName[ECX] <- EAX

```

## Error Detection

```

Error at Line 16: 'a'
Expecting one of: [], ), ;, ,, ||, &&, ==, !=, <, <=, >=, >, +, -, *, /]
Seems like missing semicolon; Inserting and continueing
10000
99999
0
1
2
3
4
5
6
7
8
9
10

```

## Error Detection

```
Error at Line 18: '/'  
Expecting one of: [ID, (, -, new, !, this, Integer, n  
Next word '2' fits in, ignoring troublesome '/' and c  
10000  
99999  
0  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10
```

## Error Detection

```
~/sr_winter/CSSE404/compiler$ ./compile.sh QuickSort  
Method Sort takes 2 arguments. Gave: 3  
Method signature called: Sort(int, int, boolean)  
Method signature required: Sort(int, int)
```

## Optimizers

- Fixes redundant data movement
  - EAX <- Mem[VarX]
  - Mem[VarX] <- EAX
- Utilizes memory addressing for instructions
  - EAX <- Mem[VarX]           ->           Push Mem[VarX]
  - Push EAX