

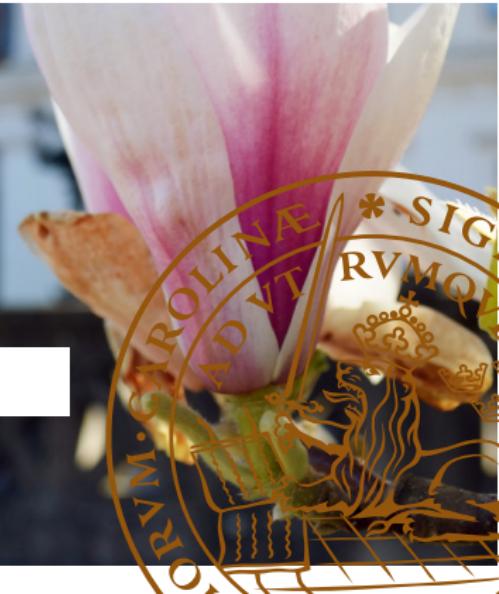


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# EDAP15: Program Analysis

META-LANGUAGES

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# Meta-Languages

BNF  
describing  
AddPrint

```
Program ::= <Stmt>*
Stmt    ::= var id := <Expr> ;
          | print <Expr> ;
Expr    ::= <Expr> + <Expr>
          | numeral
          | id
```

JastAdd  
describing  
Teal

**Meta-Language**  
**Object Language**

```
aspect NameAnalysis {
    /**
     * Get the function or variable name
     */
    syn String Decl.name() {
        return getIdDecl().getIdentifier();
    }

    // Look up the declaration matching an use.
    inh IdDecl IdUse.lookup(String s);
    syn IdDecl IdUse.lookup() = lookup(getIdentifier());
```

# Summary

- ▶ **Meta-Language** describes **Object Languages**
- ▶ **Meta-Variables** are variables in the meta-language
- ▶ Pitfall: Meta-variables can bind to object-language variables  
Example:
  - ▶ Object variable in the input program:

```
var x := 0;
```

- ▶ Meta-variable in the static analysis:

```
if (v.name == "x") {  
    print("Please use a more descriptive variable name");  
}
```