

CSCI 334:  
Principles of Programming Languages

Lecture 16: Program interpretation

Instructor: Dan Barowy  
**Williams**

Topics

Program interpretation

Your to-dos

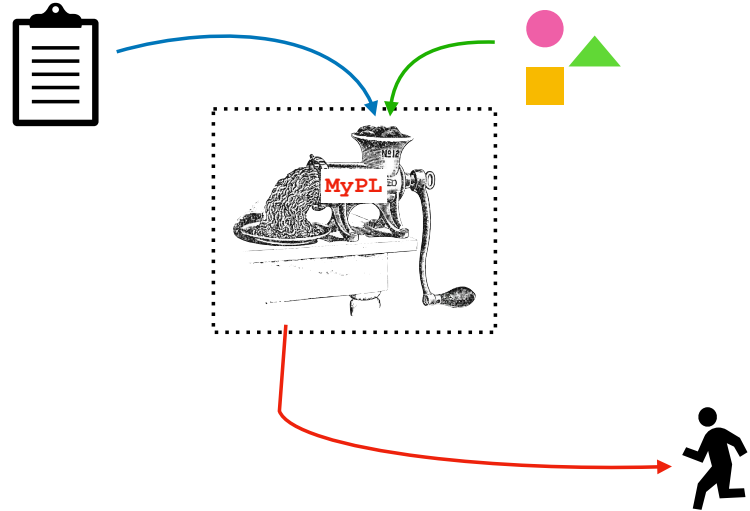
1. Quiz, **due Wednesday 11/16.**
2. Project checkpoint #1, **due Sunday 11/27**  
(partner lab)
3. (optional) extra office hours to meet about  
project proposals

Final project timeline

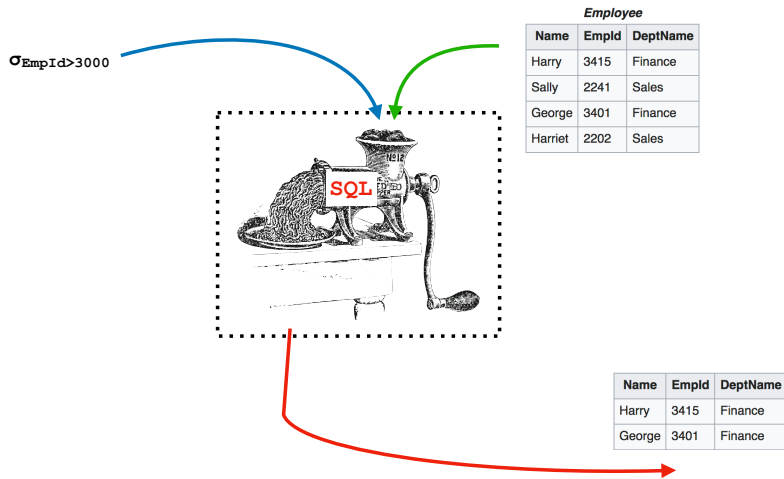
1. Minimal working version, **due Sun 11/27**
2. Mostly working version, **due Sun 12/4**
3. Language specification doc, **due Sun 12/11**
4. Project + video presentation, **due Sun 12/18**

What is a programming language?

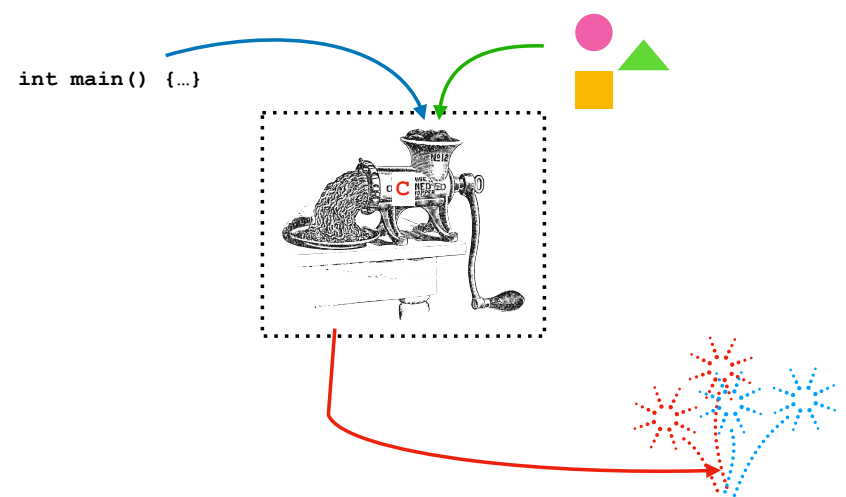
What is a programming language?



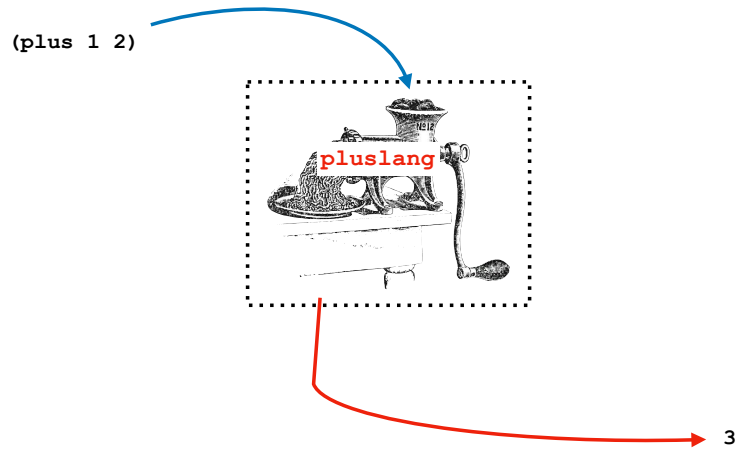
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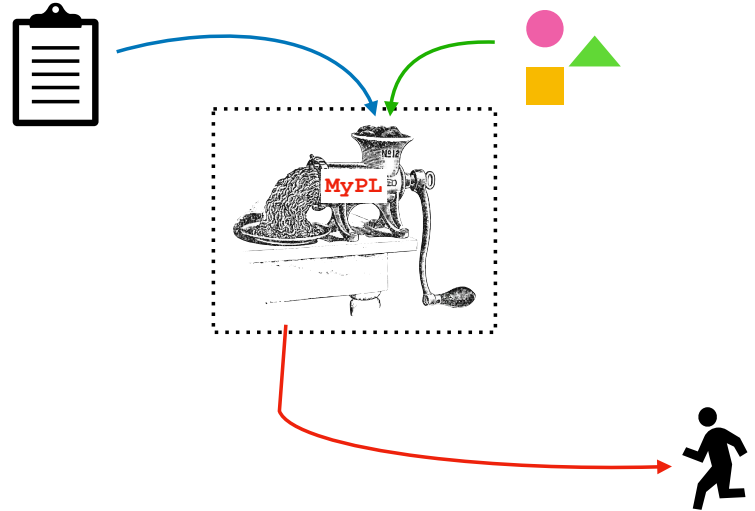
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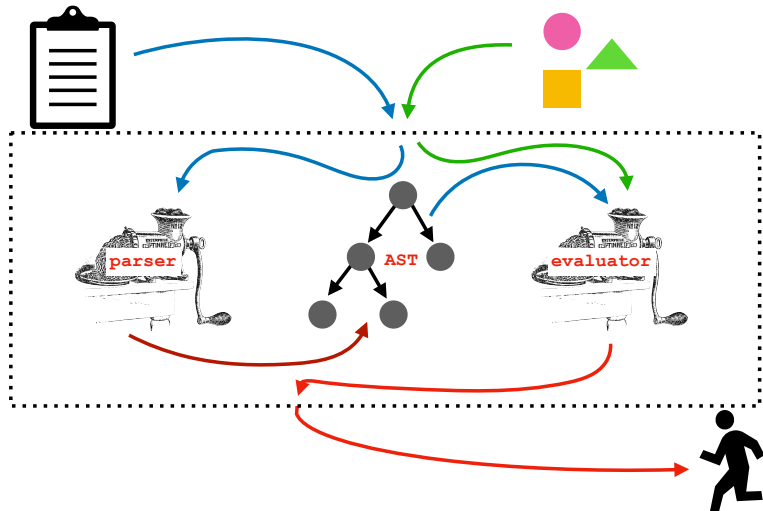
# What is a programming language?



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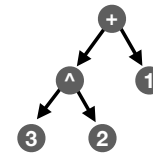
Program Interpreter

## Program Interpreter

A **program interpreter** is a computer program that “interprets” given statements or expressions in a programming language. Unlike a compiler, an interpreter **directly** interprets code, often in the form of an **abstract syntax tree**.

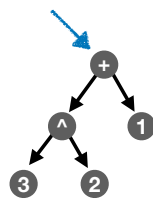
## Example

$3^2 + 1$



## Example

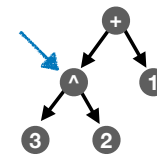
$3^2 + 1$



Eager evaluation: usually a **post-order traversal** of an AST.

## Example

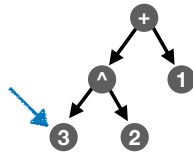
$3^2 + 1$



Eager evaluation: usually a **post-order traversal** of an AST.

### Example

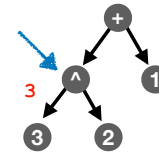
$$3^2 + 1$$



Eager evaluation: usually a **post-order traversal** of an AST.

### Example

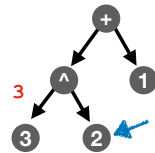
$$3^2 + 1$$



Eager evaluation: usually a **post-order traversal** of an AST.

### Example

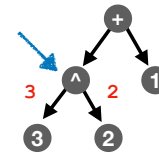
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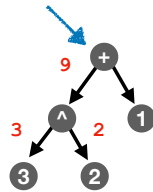
$$3^2 + 1$$



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## Example

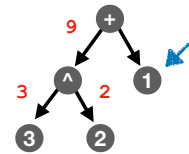
$$3^2 + 1$$



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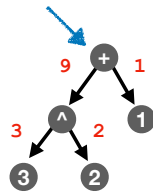
$$3^2 + 1$$



Eager evaluation: usually a **post-order traversal** of an AST.

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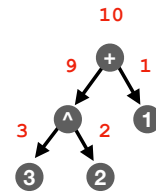
$$3^2 + 1$$



Eager evaluation: usually a **post-order traversal** of an AST.

## Example

$$3^2 + 1$$



Eager evaluation: usually a **post-order traversal** of an AST.  
This traversal is conveniently written as a **recursive function**.

## pluslang

```
<expr> ::= (plus <expr> <expr>+)  
         | n ∈ ℕ
```

```
(plus 1 2)
```

```
(plus 1 2 3 4 5)
```

(code)

## Recap & Next Class

### Today:

Program interpretation

### Next class:

Testing