



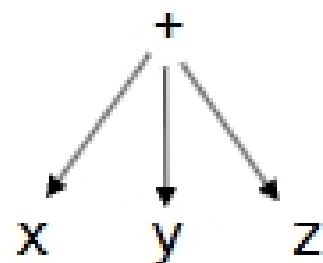
# Code Shape II

## Expressions & Arrays

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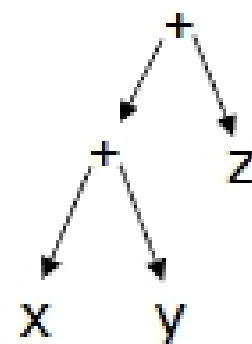
# Code Shape

$$x + y + z$$



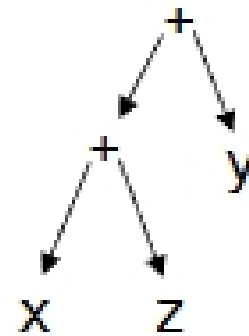
$$x + y \rightarrow t1$$

$$t1 + z \rightarrow t2$$



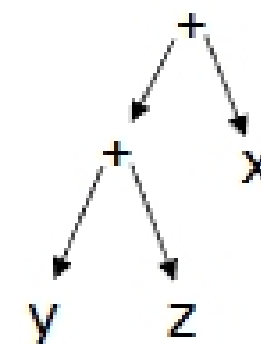
$$x + z \rightarrow t1$$

$$t1 + y \rightarrow t2$$



$$y + z \rightarrow t1$$

$$t1 + x \rightarrow t2$$



- What if  $x$  is 2 and  $z$  is 3?
- What if  $y + z$  is evaluated earlier?

Addition is commutative  
& associative for  
integers

The “best” shape for  $x + y + z$  depends on contextual knowledge

→ There may be several conflicting options



# Code Shape

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Another example -- the case statement

- Implement it as cascaded if-then-else statements
  - Cost depends on where your case actually occurs
  - $O(\text{number of cases})$
- Implement it as a binary search
  - Need a dense set of conditions to search
  - Uniform ( $\log n$ ) cost
- Implement it as a jump table
  - Lookup address in a table & jump to it
  - Uniform (constant) cost

Compiler must choose best implementation strategy

No amount of massaging or transforming will convert one into another