ASTs for Expressions

AST design

- One way to build ASTs in OO languages like Java:
  - `ASTNode` abstract class
  - Sub-class ASTNode for specific constructs (statements, expressions, etc.)
- Expression ASTNodes:
  - Binary expressions (`x + y`)
  - Unary expressions (`z++, -x, *p`)
  - Array expressions (`a[i]`)
- Node stores type of expression result

building ASTs for expressions

a + b * c

- Each expression non-terminal generates an ExpressionNode
- Expression non-terminals reference other expression non-terminals:

```
expr : term
     | expr op term ;

term : primary
     | term op primary ;
```

- Key: assume each expression non-terminal *returns a correctly-built ExpressionNode*
- Only challenge then: "hook up" the existing expression nodes to create new one, propagate types

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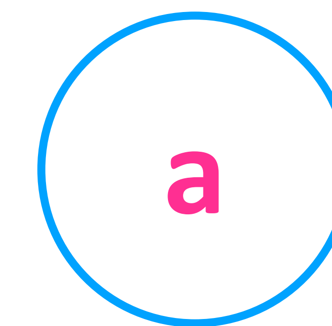

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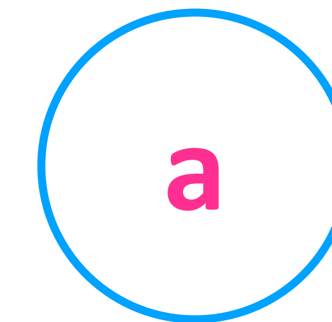

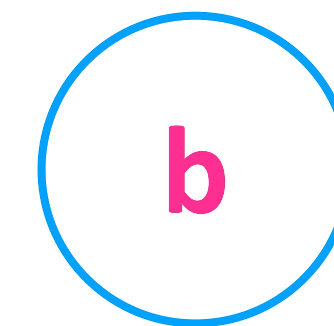

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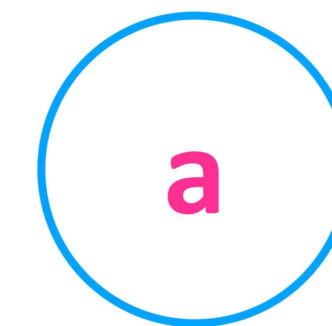

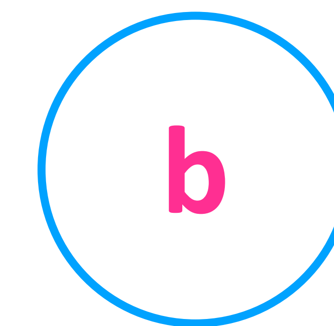

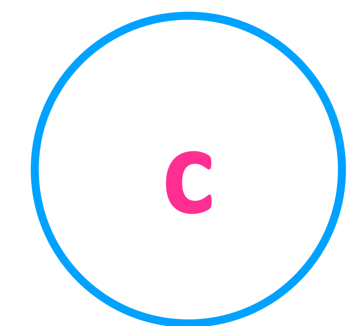

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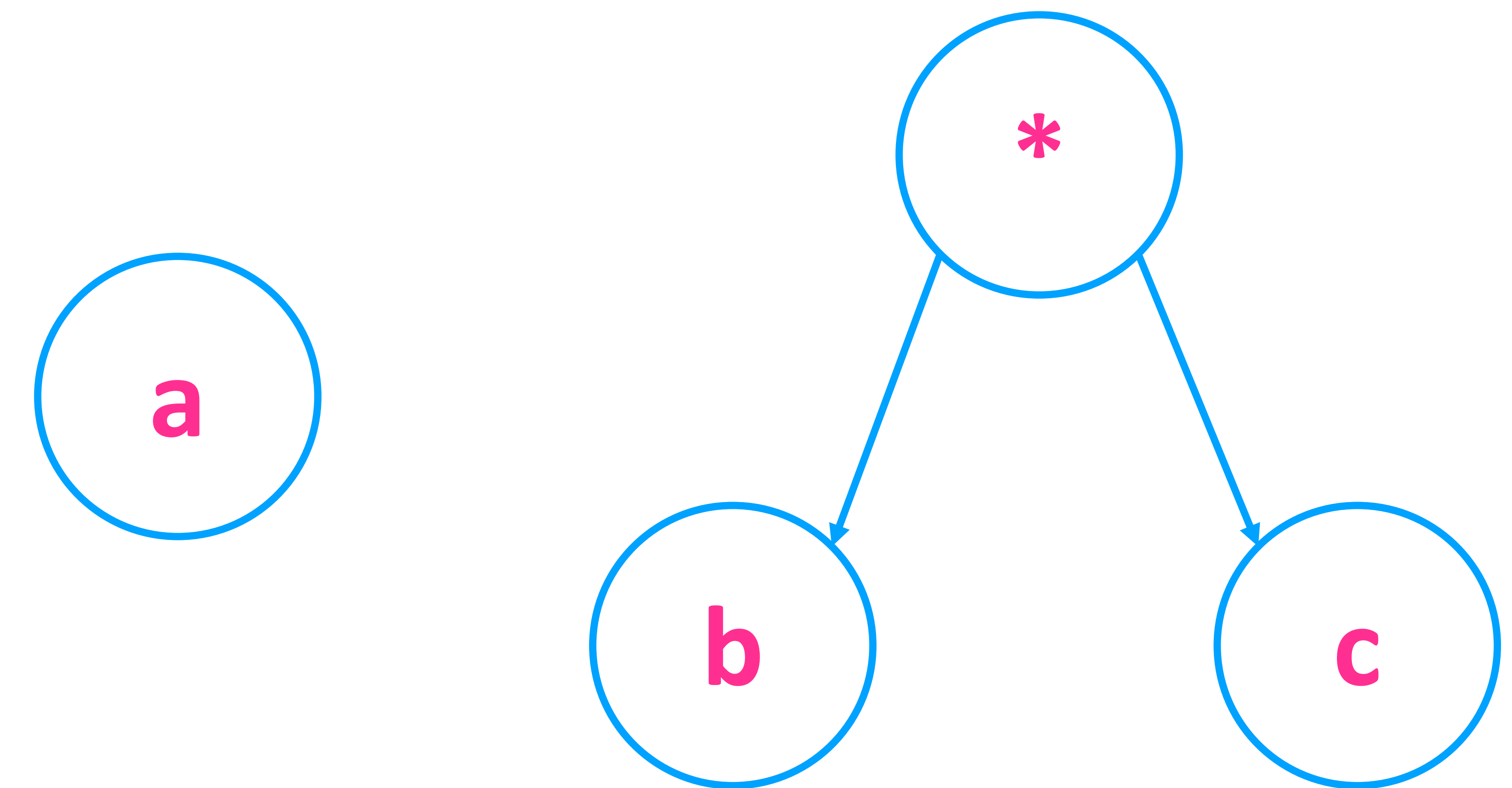

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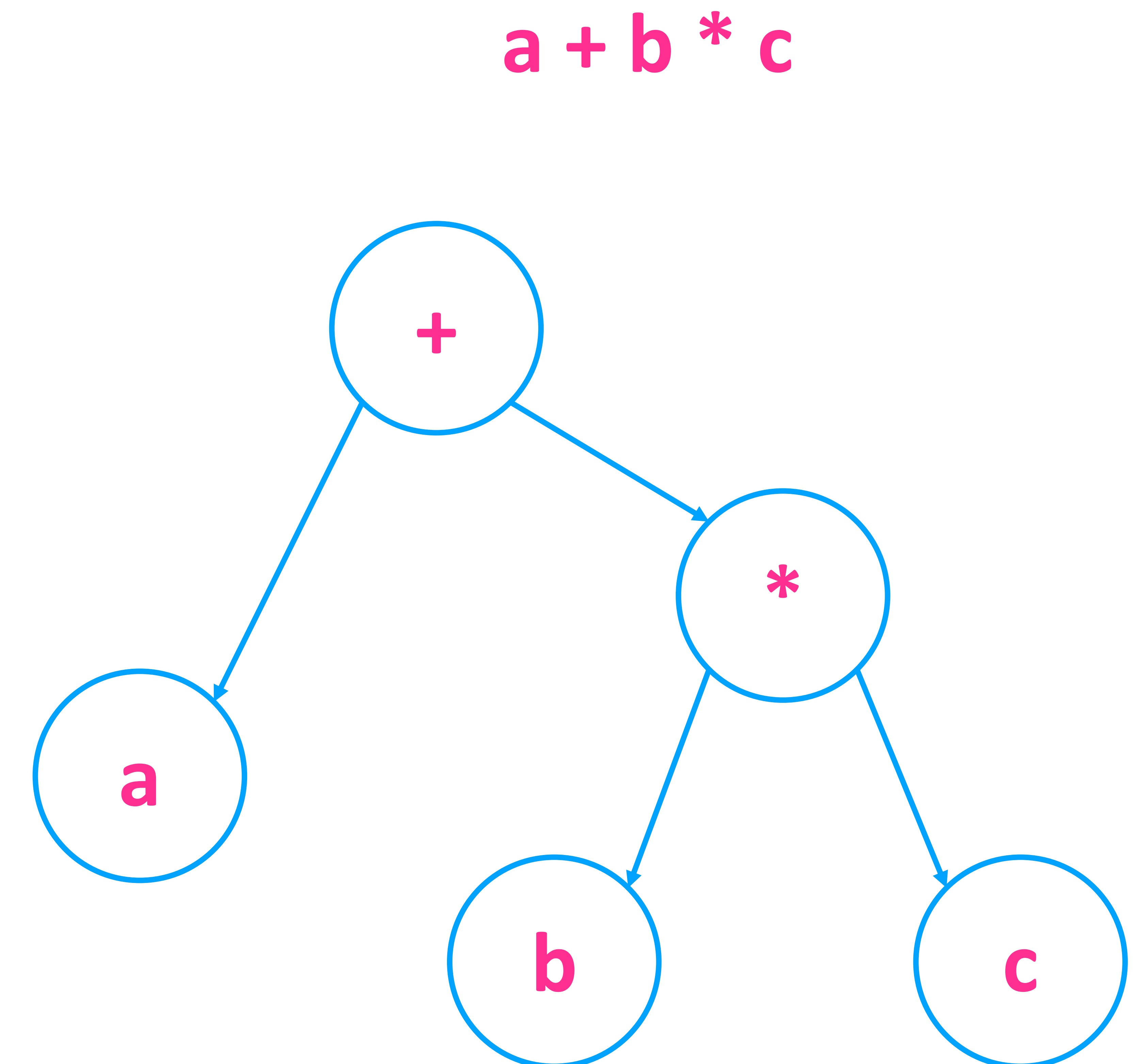

base cases

- Identifier
  - Check if variable is in symbol table
  - Create Variable AST node with pointer to symbol table
- Literals
  - Create AST node for constants
  - Often store constant value as string (why?)

other node types

- Assignment nodes
  - Store left-hand-side expression (may not be a variable!)
  - Store right-hand-side expression
- Statement lists
  - Build up list of statements recursively

next: generating code