Lecture Notes 10

Type Conversion

- Implicit Conversions (or Coercions) – The type conversion is done automatically
- Widening Conversion (e.g. int to double) – Converts to type that can accommodate at least all values represented by original type
- Narrowing Conversion (e.g. long to short) – Converts to a type that may need to store an approximation of some values
- Mixed-Mode Expression – Allows for expressions to be composed of different types
- Explicit Conversion (or Cast) – Type conversion must specifically be declared in code
  - Reinterpretation (Structured Types) – Reinterpret the raw data in another form
    - Anonymous Pointer Type (malloc & free) – A raw pointer without type
- Overflow – Result of calculation is larger than can be represented by the type
- Underflow – Result of calculation is smaller than can be represented by the type

Relational and Boolean Expressions

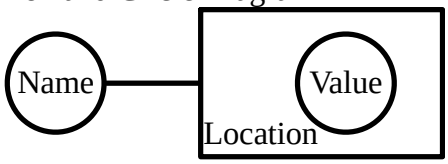
- Relational Operator – Binary operator that compares two operands resulting in a boolean value
- C-based Language Arithmetic & Relational Precedence

Highest	postfix ++, --
	unary +, -, prefix ++, --, !
	*, /, %
	binary +, -
	<, >, <=, >=
	==, !=
	&&
Lowest	||

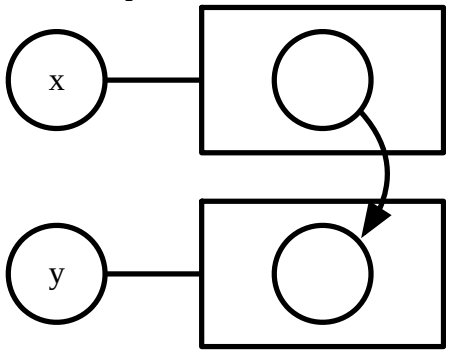
- Short-Circuit Evaluation – An expression is one in which the result is determined without evaluating all operands/operators
- Applicative Order Evaluation – Repeatedly evaluates the leftmost innermost reducible expression

Assignment Statements

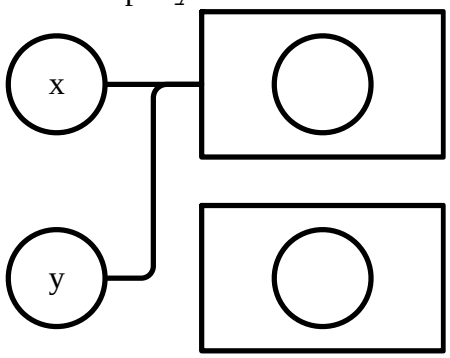
- Box and Circle Diagram



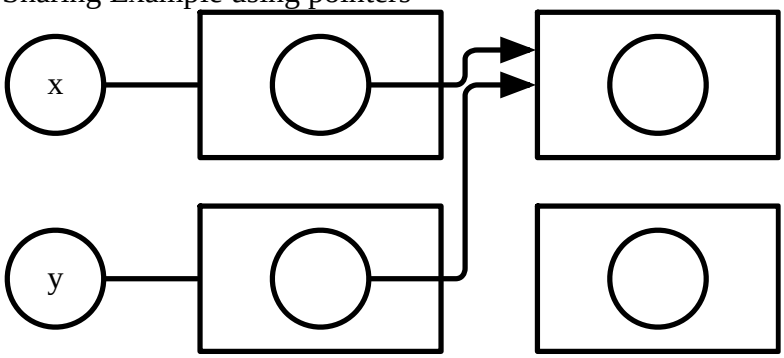
- Simple Assignment (= or `:=`) – Change the value of the variable
  - R-value – Right hand side of assignment (usually the value to be stored)
  - L-value – Left hand side of assignment (usually location of variable to change)
  - Assignment by Value Copy – Value is copied from one memory cell to other
    - Example `y = x`



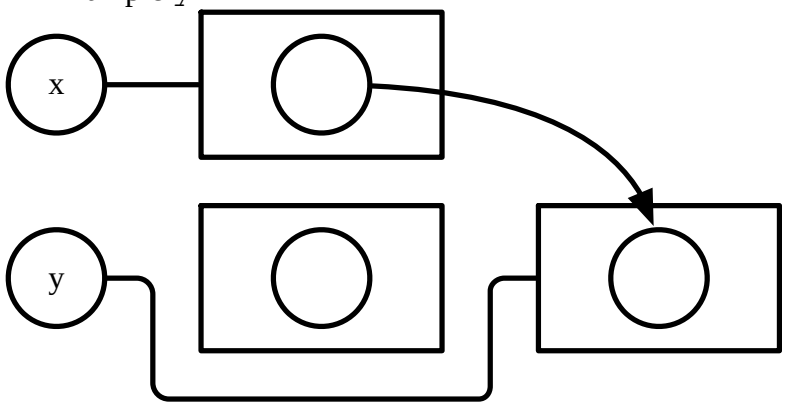
- Assignment by Sharing – Binds location of one variable to another
  - Example `y = x`



  - Sharing Example using pointers



- Assignment by Cloning – New location is allocated and value copied
  - Example `y = x`



- Conditional Targets – Uses ternary operator to select the target
  - Example in Perl

```
($flag ? $x : $y) = 0;
```

- Compound Assignment Operators (e.g. +=, *=, etc.) – Shorthand method of specifying common forms
- Unary Assignment Operators (e.g. ++, --) – Operator typically used to increment or decrement the variable
- Assignment as an Expression – Assignments in some languages evaluate to the value of the assigned value

- Multiple assignments example x is assigned value of y which is assigned 0
  ```
  x = y = 0
  ```
- Assignment in if conditional, ptr is assigned the result of locking C++ weak_ptr
  ```
  if(auto Shared = Weak.lock()){
      Shared->foo();// Only called if Shared valid
  }
  ```

- Multiple Assignments – Some languages allow for multiple values to be assigned on a single line
  - Swap example in Python
    ```
    x,y = y,x
    ```