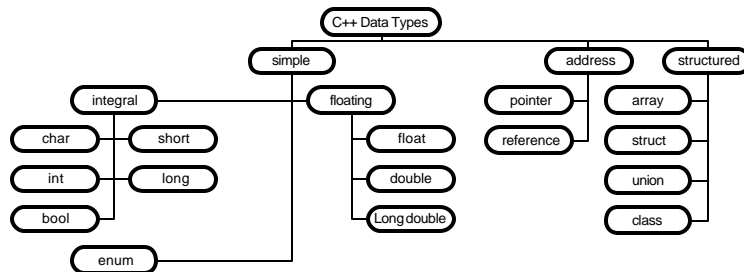


Chapter 3

The New Math



C++ Data Types





Numeric Data Types

- char
 - 1 byte
 - short
 - 2 bytes
 - int
 - 4 bytes
 - long
 - 4 bytes
-



More Numeric Data Types

- float
 - 4 bytes
 - double
 - 8 bytes
 - long double
 - 8 bytes
-



Declarations

□ Constant Examples

- const float PI = 3.14159;
- const float E = 2.71828;
- const int MAX_SCORE = 100;

□ Variable Examples

- int studentCount;
 - char grade;
 - float averageGrade;
-



Simple Arithmetic Expressions

□ Expressions are made up of constants, variables and operators

□ Examples

- alpha + 2
 - rate - 6.0
 - 4 - alpha
 - rate
 - alpha * num
-



Arithmetic Operators

- - Unary Minus
- + Unary Plus
- - Subtraction
- + Addition
- * Multiplication
- / Division
- % Modulus



□ Expression	□ Value
1. $3 + 6$	1. 9
2. $3.4 - 6.1$	2. -2.7
3. $2 * 3$	3. 6
4. $8 / 2$	4. 4
5. $8.0 / 2.0$	5. 4.0
6. $8 / 8$	6. 1
7. $8 / 9$	7. 0
8. $8 / 7$	8. 1
9. $8 \% 8$	9. 0
10. $8 \% 9$	10. 8
11. $8 \% 7$	11. 1
12. $0 \% 7$	12. 0
13. $5 \% 2.3$	13. error



Oh yeah, don't forget

- Increment
 - ++
- Decrement
 - --



Let's Get Tricky

- Precedence Rules
 - Highest: ++ -- Unary + Unary -
 - Middle: * / %
 - Lowest: + -
 - See page 1056 Appendix B for complete list



Type Coercion and Type Casting

- Type Coercion
 - The implicit (automatic) conversion of a value from one data type to another
 - Type Casting
 - The explicit conversion of a value from one data type to another
-



Examples

- `float someFloat = 3.4 / 2;`
 - `int someInt = 3.4 / 2;`
 - `someFloat = 3 / 4;`
 - `someInt = 3.4 / 2.2;`
-



Casting

- `someFloat = (double) 3 / (double) 4;`
- `someFloat = <static_cast>(double) 3 / <static_cast> (double) 4;`



Function Calls

- Example
 - `int someInt = Cube(27);`
- Function Call (Function Invocation)
 - The mechanism that transfer control to the function
- Argument List (Parameter List)
 - A mechanism by which functions communicate with each other



Formatting Output

- `setw()`
 - Tells how many characters the next item outputted should have
 - `fixed`
 - Force all subsequent floating-point output to appear in decimal notation
 - `showpoint`
 - Force decimal points in all subsequent floating-point output; even whole numbers
 - `setprecision()`
 - Tells how many decimal places all subsequent floating-point output should have
-



String Functions

- `length()` or `size()`
 - `find()`
 - `substr()`
-