Chapter 15
Templates

FORDHAM

CISC 5004 - Programming C++
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Almost Identical Functions

- Multiple functions with same behavior, different types
  - `// Find the minimum of three **ints**`
    `int TripleMinInt(int item1, int item2, int item3)`
  - `// Find the minimum of three **chars**`
    `char TripleMinChar(char item1, char item2, char item3)`
- These two functions share an identical implementation

Function Templates

- Function Template: A function definition with a special type parameter
  - `template<typename TheType>`
    `TheType TripleMin(TheType item1, TheType item2, TheType item3)`
  - Example
  - Compiler automatically generates any functions that are actually used in the code
  - Programmer may specify the type explicitly:
    - `TripleMin<int>(num1, num2, num3);`
- Note: Earlier versions of C++ used `class` instead of `typename`
- Coding example

Class Templates

- Just as with functions, classes can be nearly identical, except for their data types
  - Example
- Class Template: Class definition with a special type parameter
  - A variable declared of that class type must specify the type
  - Example
- Can use multiple template parameters for classes (as with functions, above)
- We've seen this before:
  - `std::vector<int> nums(100)`
- Coding example

Examples/Labs

- Map values using a template
- Zip code and population