

Adding Elements to Strings Solutions

append()

- Explain what the append() member function of std::string does
 - It adds its argument at the end of the string
- In the code below, what are the final values of hello and hello2?

```
string hello {"Hello"};  
hello.append(" world");           // hello = "Hello world"  
string hello2 {"Hello"};  
hello2.append("wow!!!!", 3, 2);    // hello2 = "Hello!!!"
```

- Write a program to check your answer

insert()

- Explain what the insert() member function of std::string does
 - Adds characters before a specified position in the string
- For each of the code samples which follow
 - State the final value of the string after the insert operation
 - Write a program to check your answer

insert()

```
string str{ "for" };  
str.insert(2, "lde");
```

// string is now "folder"

```
string str2{ "care" };  
string str3{ "omp" };  
str2.insert(1, omp);
```

// string is now "compare"

insert() Contd

```
string str { "xx" };  
string str2{ "trombone" };  
str.insert(1, str2, 4, 2);    // string is now "xbox" (TM)
```

```
string str3("cash");  
str3.insert(1, 3, 'r');      // string is now "crrrash"
```

```
auto opos = hello.find('o');  
hello.insert(opos, 2, 'o');  // string is now "hellooo"
```

Iterators

```
string str{ "word" };  
auto last = str.end() - 1;  
str.insert(last, 'l');
```

// str is now "world"

```
string str2{ "ski" };  
auto last2 = str2.end();  
str2.insert(last2, 2, 'l');
```

// str is now "skill"

Iterator Invalidation

- What is meant by "iterator invalidation" in the context of calling `insert()` on `std::string`?
 - When elements are added to an `std::string`, the string object may not have enough storage to hold the new characters
 - In this case, it will allocate a new memory buffer and copy all the characters there
 - If the program saved any iterators to the string object before the `insert()` operation, these will still be pointing to the old buffer
 - These iterators will be invalid
- Write a simple program which demonstrates iterator invalidation

Iterator Invalidation Contd

- How can we deal with iterator invalidation?
 - We must assume that all iterators which were saved before the insert() call are now invalid
 - If we need to use them again, we must reassign them
- Alter your program from the previous slide, so that it handles iterator invalidation correctly