

The **string** Class

Lecture 21

Sections 2.9, 3.9, 3.10

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1 The String Class

- String Class Member Functions

2 Assignment

Outline

- 1 The String Class
 - String Class Member Functions
- 2 Assignment

String Declarations and Initialization

Strings

```
string s;           // Empty string  
string t = "Hello"; // Initialized
```

- A string may simply be declared, or it may be declared and initialized by another string.
- If it is not explicitly initialized, then it is set to the empty string.

String Operators

- Assignment =
- Input and output >>, <<
- Equality ==, !=
- Relational <, >, <=, >=
- Concatenation +, +=
- Subscript []

Member Functions

object.member-function()

- A data type may have **member functions**.
- A member function is a function that can be invoked only by means of an object of that type.
- Typically, a member function acts on the object that invokes it.
- We have already used the `string` member function `size()` to get the size of a `string`.

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String Member Functions

String Member Functions

```
int length();  
int size();  
char* c_str();
```

- `length()`, `size()` – Returns the number of characters in the string.
- `c_str()`; – Returns the same string, but as a C-type null-terminated string.

C-type Strings

- A C-type string is a simple structure, different from the `string` class, which is considerably more complicated.
- The characters are stored in consecutive bytes of memory.
- A **null** character (ASCII 0) marks the end of the string.
- C-type strings are also called **null-terminated** strings.
- The string "Hello, World" would be stored as

H	e	l	l	o	,		W	o	r	l	d	\0
---	---	---	---	---	---	--	---	---	---	---	---	----

C-type Strings

File Input

```
string path = "C:/Documents/My_file.txt";  
ifstream fin(path.c_str());
```

- Some library functions require C++ `strings` and others require C-type strings.

Example

- Example
 - `LetterCount.cpp`
- Experiment by changing `isalpha()` to `isdigit()`, `ispunct()`, and `iscntrl()`.

String Member Functions

String Member Functions

```
int find(string str);  
void append(string str);
```

- `find()` – Get the index of a specified string `str` as a substring of the invoking string; return `-1` if the specified string cannot be found.
- `append()` – Append a specified string `str` to the end of the invoking string.

Example

- Example
 - `FindString.cpp`

String Member Functions

String Member Functions

```
void insert(int i, string str);  
string substr(int i, int j);
```

- `insert()` – Insert a specified string `str` into the invoking string, beginning at a specified position `i`.
- `substr()` – Get the substring of a specified length `j`, beginning in a specified position `i`.

String Member Functions

String Member Functions

```
void erase(int i, int j);  
void clear();  
bool empty();
```

- `erase()` – Remove a specified number `j` of characters from the invoking string, beginning in a specified position `i`.
- `clear()` – Remove all characters from the string.
- `empty()` – Determine whether the string is empty. Return `true` if the string has length 0; `false` otherwise.

Example

- Example
 - `FindAndReplace.cpp`
- What happens if we replace "a" with "an"?

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Assignment

Assignment

- Read Sections 2.9, 3.9, 3.10.