string CLASS FUNCTIONS

An Introduction

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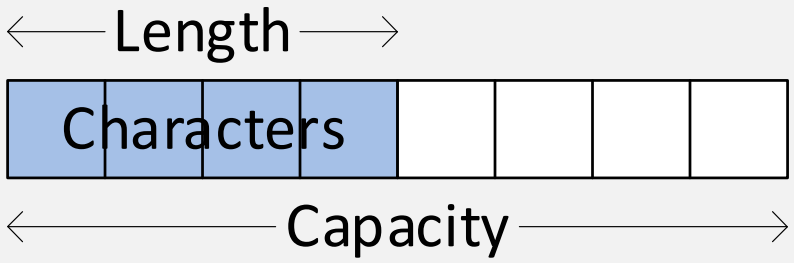
C++ `string` CLASS REVIEW

- `#include <string>`
- Class data and functions called members
- Header prototypes non-member functions
- Hides data members
- Binds function calls to `string` objects

- `size_t` is a portable type suitable for saving a size
- Input with `getline(cin, s);`
- output with `cout << s << endl;`

BASIC OPERATIONS:
length AND capacity




```
size_t length();
size_t size();
size_t capacity();
```

```
string s;


for (size_t i = 0; i < s.length(); i++)
for (size_t i = 0; i < s.size(); i++)

cout << s.length() << " " <<
    s.capacity() << endl;
11 15
```

A PREREQUISITE: OVERLOADED OPERATORS

- Overloaded operators: `operator`🙂
- Function name is "operator" followed by the operator
  - `char& operator[](size_t pos);`
  - `string operator+(const string& lhs, const string& rhs);`
- Overloaded operator functions allow a novel calling syntax:
  - `s1` 🙂 `s2`

CHARACTER ACCESS

- `char& operator[](size_t pos);`
  - Does NOT validate the index
- `char& at(size_t pos);`
  - Validates the index
- `char& front();`
- `char& back();`
- An r-value expression is a value
- An l-value expression is an address

```
for (size_t i = 0; i < s.length(); i++)
    cout << s[i] << endl;

for (size_t i = 0; i < s.size(); i++)
    cout << s.at(i) << endl;

s[0] = 'X';

s.at(0) = 'Z';

c = s.front();       s.front = 'A';
c = s.back();        s.back() = 'B';
```

ASSIGNMENT

```
string& operator=(const string& rhs);
string& operator=(const char* s);
string& operator=(char c);

string s1(“hello”);
string s2;
s2 = s1;
s2 = “hello”;
s2 = ‘X’;
```

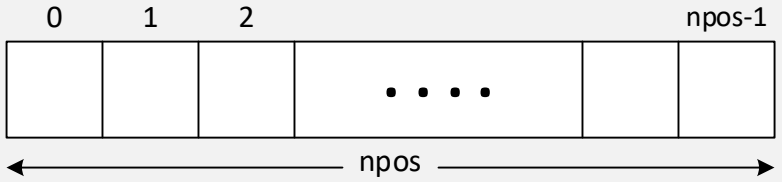
CONCATENATION

```
string operator+(const string& lhs, const string& rhs);
string operator+(const string& lhs, const char* s);
string operator+(const string& lhs, char c);

string s1(“hello”);
string s2(“ world”);
string s3;
s3 = s1 + s2;
s3 = s1 + “ world”;
s3 = s1 + s2 + ‘!’;
```

CONCATENATION WITH ASSIGNMENT

```
string& operator+=(const string& rhs);
string& operator+=(const char* s);
string& operator+=(char c);

string s1(“hello”);
string s2(“ world”);
s1 += s2;
s1 += “ world”;
s1 += ‘ ’;
s1 += “world”;
```

THE `string` CLASS CONSTANT `npos`



- `string s(…);`
- `int i = s.length();`
- `0 ≤ i ≤ s.length()-1`

- `string::npos`

THE `find` AND `rfind` FUNCTIONS

- `size_t  find(const string& str, size_t pos = npos);`
- `size_t  find(const char* str, size_t pos = npos);`
- `size_t  find(const char c, size_t pos = npos);`
- Returns `npos` if the string or character is not found

```
string s = "Hello, World!";
size_t index = s.find("World");
if (index != string::npos)
    …
```

```
string s = "Hello, World!";
size_t index = s.rfind('l');
if (index != string::npos)
cout << s.rfind('l', 5) << endl;
```

CONVERTING BETWEEN NUMBERS AND STRINGS

- `string to_string(int val);`
- `string to_string(double val);`

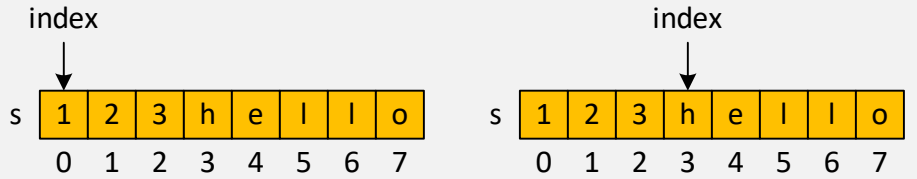
- `string s1 = to_string(123);`
- `string s2 = to_string(3.14);`

- `int stoi(const string& str, size_t* index = nullptr, int base = 10);`
- `double stod(const string& str, size_t* index = nullptr);`

- `int i = stoi(s1);`
- `int i = stoi("0XAF27", 16);`
- `double d = stod(s2);`

THE index ARGUMENT

```
string s = "123hello";
int index = 0;
int counter = stoi(s, &index);
```



- Passed by pointer, making it an INOUT argument
- The function sets it to the location of the first non-convertible character
- The function throws an exception if the string begins with a non-number character: “x123hello”