CS2141 – Software Development using C/C++

Strings

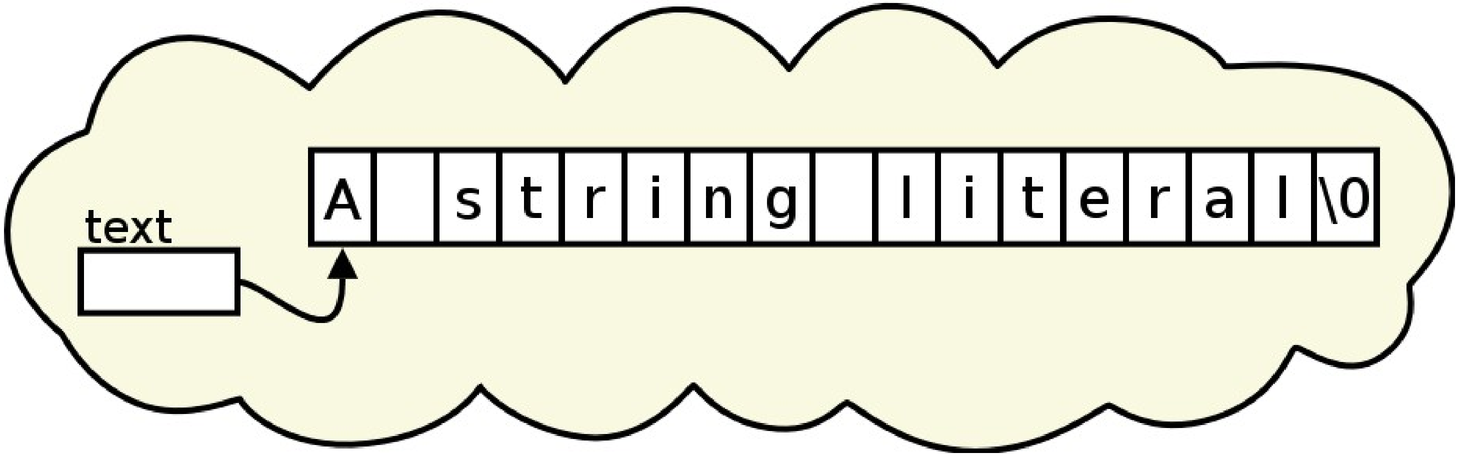
Character functions

- The old **`cctype`** header defines some functions for working with characters:
  - **`isalpha( c )`** True if c is alphabetic
  - **`isupper( c )`** True if c is uppercase
  - **`islower( c )`** True if c is lowercase
  - **`isdigit( c )`** True if c is a decimal digit
  - **`isalnum( c )`** True if c is alphanumeric
  - **`isspace( c )`** True if c is whitespace
  - **`ispunct( c )`** True if c is a punctuation character
- There are a few others

String Literals

- In C++ string literals are arrays of characters
- Usually a pointer is used to refer to the string
- These strings are null-terminated, meaning the last character in the array is the null character

```
char * text = “A string literal”;
```



String Literals cont.

- Pointers can be used to pass and manipulate string values:

```
int vowelCount( const char * p ) {
   int sum = 0;
   while( 1 )
   switch( *p++ ) {
      case '\0': return sum;
      case 'a': case 'e':case 'i':
      case 'o': case 'u':
      sum++;
      break;
   }
return sum;
}
```

cstring

- String functions from C are often used in C++
- These functions manipulate arrays of characters
- Often they assume the string is null-terminated
- Some of the functions provided by **`cstring`** (or **`string.h`**) are:
  - **`strcpy( dest, src )`**
    Copies characters from src to dest
  - **`strncpy( dest, src, n )`**
    Copies n characters from src to dest

cstring cont.

- `strcat( dest, src )`

  Append characters from src to dest
- `strncat( dest, src, n )`

  Append only n characters
- `strcmp( s1, s2 )`

  Compare two strings
- `strncmp( s1, s2, n )`

  Compare first n charcters of two strings
- `strlen( s )`

  Length of the string

C++ Strings

- C++ has a newer **string** type:

```
#include <string>
using std::string;

...

string a;
string b = “Initial string”;
string c( “Another string” );
string d( b );

a = “A different string”;
```

C++ String Functions

- The `string` type has many functions:

Number of chars	`s.length( )`
Assign	`s1 = s2`
Append	`s1 += s2`
Concatenate	`s1 + s2`
Character access	`s[index]`

Comparison	`s1 == s2, s1 != s2`
	`s1 < s2, s1 > s2`

Substring	`s.substr( start, length )`
Input	`cin >> s;`

String Streams

- String concatenation and assignment only works with other strings

```
int a = 5;
string text = “a=” + a;  // This won't work!
```

- For other data types, a string stream can be used:

```
#include <sstream>
using std::ostringstream;
...
int a = 5, b = 6;
ostringstream formatter;
formatter << “The sum of “ << a << “ and “ << b
<< “ is “ << (a + b);
string s = formatter.str( );
```