

# Strings

- C-style strings are null-terminated arrays of `chars`

- e.g. `char my_string[100];`

- To get the length of a c-style string:

```
int length = 0;
while( my_string[length] != '\0' )
{
    length++;
}
```

- To copy a c-style string:

```
int i = 0;
while( my_string[i] != '\0' )
{
    other_string[i] = my_string[i];
}
other_string[i] = '\0';
```

# The string class

- These operations are wrapped up in standard functions
  - Used all the time, no sense rewriting the code
  - `strlen`, `strcpy`, `strcmp`, etc.
- But c-style strings are still inconvenient
  - Arrays are fixed size, so you have to always make sure the array is bigger than whatever text is coming in
- That's why C++ introduced the class `string`

# The string class

- String variables don't have to specify a size

```
string s = "This is my string";
```

- A string variable can take values of different sizes

```
string s = "short";
```

```
s = "loooooooooooooooooooooooooooooooooooooooooong";
```

# The string class

- Strings have built-in functionality

- Length of a string

```
string s = "Juicyfruit";  
cout << s.len();           // prints 9
```

- Copy a string

```
s2 = s1;
```

- Append to a string

```
string s = "You win";  
s.append( " a boot to the head" );
```

- Find a sub-string, get a sub-string

```
string s = "Rapunzel";  
int pos = s.find( "zel" ); // returns 5  
cout << s.substr( 2, 5 ); // prints "punze"
```

# How Can `string` Do All This?

- Variables can't hold different size things
  - Even arrays are fixed sized
- Variables don't have functions, they just store stuff
  
- Any ideas?

# Object-Oriented Programming

- In C++ classes provide the functionality necessary to use *object-oriented programming*
  - OOP is a particular way of organizing computer programs
  - It doesn't allow you to do anything you couldn't already do, but it makes it arguably more efficient
  - OOP is by far the dominant software engineering practice in the last two decades
- Classes combine data and functionality
  - Class members can store structured data, as we've seen
  - Class members can also be functions
    - Class-specific functions are called *methods*

# The string class

- The string class has *private* data members to store the characters that make up a string
  - It probably uses an array, although it doesn't have to
  - It probably has ints to keep track of the size of the array and the number of characters
- The string class has public methods to do stuff
  - Return the number of characters in the internal storage

```
int len();
```
  - Append the characters in *s* to the internal storage

```
void append( string s );
```
  - returns the position of *s* within the internal storage

```
int find( string s);
```