COMP 2401 -- Tutorial #4

Strings

Learning Objectives

After this tutorial, you will be able to:

- manipulate strings by accessing and modifying their component characters

Tutorial

1. Download the file `T04.tar.gz` from the tutorial page in *cuLearn*.

   This file is both archived (tar) and compressed (gzip). Use the `man`/`help` pages to see how to extract the files in this file. Using gzip to compress a tar file is a common way to compress files in Unix/linux (and is essentially equivalent to zipping files.)

   A Caesar shift cipher is an encryption cipher where each letter in the plaintext is replaced with a letter a fixed number of positions away in the alphabet. The number of positions that the letters are shifted forms a key for this cipher. For example, with a shift of 5 to the right, 'A' becomes 'F', 'B' becomes 'G', 'Y' becomes 'D', and so on. You can learn more about the Caesar shift cipher here. Note that only letters are affected by the cipher, and non-letter characters remain unchanged.

2. Finish writing the functions `encryptCaesar()` and `decryptCaesar()` so that they encrypt and decrypt a Caesar shift cipher with a shift of key to the right.

3. The string cipher has been encrypted using a Caesar shift cipher, but the key is unknown. Determine what the key is, and decrypt the message. Hint: Are there many possible keys?

Exercises

1. Write a function `camelCase(char *str)` which removes all spaces from `str` and capitalizes the first letter of every word (except the first) in `str`.

2. Write a function `slugify(char *str)` which removes all non-letter, non-number characters from `str`, and replaces any whitespace between words with a single hyphen to separate words. All letters should be put lower case. For example:

```
char plain[] = " - Friends, Romans, countrymen,   lend me your ears?";
printf("%s\n", plain);
slugify(plain);
printf("%s\n", plain);
```

   should output:

```
- Friends, Romans,  countrymen,   lend me your ears?
friends-romans-countrymen-lend-me-your-ears
```

The Caesar shift cipher is used in more complex ciphers, such as the Vigenère cipher, whose description is given here. Note that instead of consulting a Vigenère table, when encrypting with a letter from the key, it is equivalent to apply a Casear shift to the right with the 'value' of the key letter, where 'A' = 0, 'B' = 1, ... , Z = '25'. For example, to encrypt with 'F', apply a Caesar shift of 5 to the right.

3. Using the functions you wrote for the Caesar shift cipher, write the functions `encryptVigenere(char *plaintext, char *key)` and `decryptVigenere(char *ciphertext, char *key)`, which encrypt and decrypt a Vigenère cipher with a key given by the string key.