BIL 105E – Introduction to Scientific and Engineering Computing (C)

Spring 2015-2016

Homework 3 Report

Assignment Date: 19.04.2016

Due Date: 01.05.2016, 23:00

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Introduction:

As stated in description of homework, we are supposed to implement some character sequence (i.e., string) operations by using pointers and functions. Also this homework aims to consolidate the usage of pointers and improve programming skills.

Development Environment:

My project includes 1 C file, named 150140032.c and 1 executable file, named 150140032. I wrote my code Atom Editor on Mac OS, and compile it with GCC compiler in two different platforms (Mac OS and Linux). My command that I used to compile is
“gcc 150140032.c –o 150140032”.

Variables:

Defined in main function:

- choice: an integer to hold the user’s operation choice
- space: an integer to allocated memory space
- times: an integer to hold number of replacements
- *ccs: a pointer to hold current character sequence
- *insert, *find, *replace: pointers to hold some required strings
- begin_index and end_index: integers to hold range of indeces.

Defined in sub_string:

- *sub: a pointer to hold sub string

Defined in remove_string:

- *sub: a pointer to hold sub string
- diff: an integer to hold length of “remove”

Defined in replace_string:

- diff: an integer to hold change of length caused by replacements
- *temp: an char pointer to hold replacement string temporarily

*Detailed information is in comment lines of the source code and the flowchart at next page.

Used Funtions:

int set_ccs(char **ccs)
char *sub_string (char *ccs, int begin_index, int end_index)
char *remove_string(char **ccs, int begin_index, int end_index)
int insert_string(char **ccs, char *insert, int begin_index)
int replace_string(char **ccs, char *find, char *replace)

Conclusion:

This was a beneficial homework that improved my programming skills. I fully understood the usage of char pointers and memory allocation. If it is necessary to change or allocate char sequence in other functions, the function should call by reference of pointer.

FlowChart

```
int function user_menu {
  print the menu;
  read the user's choice;
  return choice;
}


int function set_ccs{
  allocate the css size of 81 char initially;
  read the css from user;
  reallocate the css;

  If allocation is unsuccessful
      return -1;
  return allocated space;

}

char* function sub_string{
  If begin_index and end_index are out of range
    return NULL;

  define and allocate *sub just enough;

  for (i = 0; i <= end_index - begin_index; i++)
     *(sub+i) = *(ccs+i+begin_index);

  return sub
}

char* function remove_string {
  diff = end_index - begin_index + 1;
  get *sub using sub_string function;

  if (sub == NULL) return NULL;

  for (i = end_index+1; i <= strlen(*ccs); i++){
    // slide the css to left
    *(*ccs+i-diff) = *(*ccs+i);
  }

  return sub
}
```

```
int function insert_string{
  expand the size of css just enough;

  for (i = ccslen; begin_index <= i; i--){
    // slide the character to right
    *(*ccs+i+inslen) = *(*ccs+i);}

  for ( i = 0; i < inslen; i++){
    // add the characters in insert into the ccs
    *(*ccs+i+begin_index) = *(insert+i);}

  free allocated space for insert;
  return new length of ccs;
}

int function replace_string {
  int times = 0;

  for (i = 0, j = 0; i < lenccs; i++){
    diff = times * (lenreplace - lenfind);

    If i'th char of ccs is equal to j'th char of find
      j += 1;
    Else{
      I -= j;
      j = 0;}

    if j == lenfind, so there is a match{
      remove the “find” string;
      insert the “replace” string;
       times += 1;
       j = 0;
     }
  }
  free allocated space for find;
  free allocated space for replace;
  return times;
}
```