Lab 4 – Character Strings

Lab session – The first hour is scheduled for lab session. There are two questions in this lab session. In addition, there is 1 practice question for you to try if you have extra time in the lab.

Note: You do not need to submit your code for this lab.

Lab Questions

1. **(sweepSpace)** Write two versions of a C function that remove all the blank spaces in a string. The first version sweepSpace1() will use array notation for processing the string, while the other version sweepSpace2() will use pointer notation. The function prototypes are given below:

```
char *sweepSpace1(char *str);
char *sweepSpace2(char *str);
```

A sample program template is given below to test the functions:

```
#include <stdio.h>
#include <string.h>
char *sweepSpace1(char *str);
char *sweepSpace2(char *str);
int main()
{
  char str[80],str2[80], *p;

  printf("Enter the string: \n");
  fgets(str, 80, stdin);
  if (p=strchr(str,'\n')) *p = '\0';
  strcpy(str2,str);
  printf("sweepSpace1(): %s\n", sweepSpace1(str));
  printf("sweepSpace2(): %s\n", sweepSpace2(str2));
  return 0;
}
char *sweepSpace1(char *str)
{
  /* Write your program code here */
}
char *sweepSpace2(char *str)
{
  /* Write your program code here */
}
```

Some sample input and output sessions are given below:

(1) Test Case 1:
Enter the string:

```
#include<stdio.h>
#include <string.h>
char *sweepSpace1(char *str);
char *sweepSpace2(char *str);
int main(){
   char str[80],str2[80],*p;

   printf("Enter the string:\n");
   fgets(str,80,stdin);
   if(p=strchr(str,'\n')) *p = '\0';
   strcpy(str2,str);
   printf("sweepSpace1():%s\n",sweepSpace1
(str));
   printf("sweepSpace2():%s\n",sweepSpace2
(str2));
   return 0;
}
char *sweepSpace1(char*line)
{
   int i,j=0;
   for(i=0;i<strlen(line);i++)
   {
      if (line[i] !=' ')
      {
         line[j] = line[i];
         j++;
      }
   }
   line[j] = '\0';
   return line;
}
```

```
char *sweepSpace2(char*line)
{
   int i,j=0;
   for(i=0;i<strlen(line);i++)
   {
      if (*(line+i) !=' ')
      {
         *(line+j) = *(line+i);
         j++;
      }
   }
   *(line+j) = '\0';
   return line;
}
```

```
i am a boy
sweepSpace1(): iamaboy
sweepSpace2(): iamaboy
```

(2) Test Case 2:

```
Enter the string:
anybody
sweepSpace1(): anybody
sweepSpace2(): anybody
```

2. (**findTarget**) Write a C program that reads and searches character strings. In the program, it contains the function findTarget() that searches whether a target name string has been stored in the array of strings. The function prototype is

```
int findTarget(char *target, char nameptr[][80], int size);
```

where *nameptr* is the array of strings, *size* is the number of names stored in the array and *target* is the target string. If the target string is found, the function will return its index location, or -1 if otherwise.
In addition, the program also contains the functions readNames() and printNames(). The function readNames() reads a number of names from the user. The function prototype is given as follows:

```
void readNames(char nameptr[][80], int *size);
```

where *nameptr* is the array of strings to store the input names, and *size* is a pointer parameter which passes the number of names to the caller. The function prototype of printNames() which prints the names is given as follows:

```
void printNames(char nameptr[][80], int size);
```

A sample program template is given below for testing the functions:

```
#include <stdio.h>
#include <string.h>
#define SIZE 10
#define INIT_VALUE 999
void printNames(char nameptr[][80], int size);
void readNames(char nameptr[][80], int *size);
int findTarget(char *target, char nameptr[][80], int size);
int main()
{
  char nameptr[SIZE][80], t[40], *p;
  int size, result = INIT_VALUE;
  int choice;

  printf("Select one of the following options: \n");
  printf("1: readNames()\n");
```



```
#include <stdio.h>
#include <string.h>
```

```
    printf("2: findTarget()\n");
    printf("3: printNames()\n");
    printf("4: exit()\n");
    do {
      printf("Enter your choice: \n");
      scanf("%d", &choice);
      switch (choice) {
        case 1:
          readNames(nameptr, &size);
          break;
        case 2:
          printf("Enter target name: \n");
          scanf("\n");
          fgets(t, 80, stdin);
          if (p=strchr(t,'\n')) *p = '\0';
          result = findTarget(t, nameptr, size);
          printf("findTarget(): %d\n",  result);
          break;
        case 3:
          printNames(nameptr, size);
          break;
      }
    } while (choice < 4);
    return 0;
}
void printNames(char nameptr[][80], int size)
{
    int i;

    for (i=0; i<size; i++)
      printf("%s ", nameptr[i]);
    printf("\n");
}
void readNames(char nameptr[][80], int *size)
{
    /* Write your code here */
}
int findTarget(char *target, char nameptr[][80], int size)
{
    /* Write your code here */
}
```

Some sample input and output sessions are given below:

(1) Test Case 1:
Select one of the following options:
1: readNames()()
2: findTarget()

```
#define SIZE 10
#define INIT_VALUE 999
void printNames(char nameptr[][80],int size);
void readNames(char nameptr[][80],int *size);
int findTarget(char*target,char nameptr[][80],int
size);
int main(){
    char nameptr[SIZE][80],t[40],*p;
    int size,result = INIT_VALUE;
    int choice;

    printf("Select one of the following options:\n");
    printf("1:readNames()\n");
    printf("2:findTarget()\n");
    printf("3:printNames()\n");
    printf("4:exit()\n");
    do{
        printf("Enter your choice:\n");
        scanf("%d",&choice);
        switch(choice){
            case 1:
                readNames(nameptr, &size);
                break;
            case 2:
                printf("Enter target name:\n");
                scanf("\n");
                gets(t);
                result = findTarget(t,nameptr,size);
                printf("findTarget():%d\n",result);
                break;
            case 3:
                printNames(nameptr, size);
                break;
        }
    }while(choice<4);
    return 0;
}
void printNames(char nameptr[][80],int size)
{
    int i;

    for(i=0;i<size;i++)
        {printf("%s",nameptr[i]);}
    printf("\n");
}
void readNames(char nameptr[][80],int*size)
{
    int i;
    printf("Enter size:\n");
    scanf("%d", size);
    printf("Enter %d names:\n", *size);
    for(i=0;i< *size;i++)
    {    scanf("%s",nameptr[i]);}
}
int findTarget(char *target,char nameptr[SIZE]
[80],int size)
{
    int i;
    for (i=0;i<size;i++)
    {
        if (strcmp(nameptr[i], target) == 0)
            return i;
    }
    return -1;
}
```

3: printNames()
4: exit()
Enter your choice:
1
Enter size:
4
Enter 4 names:
Peter Paul John Mary
Enter your choice:
2
Enter target name:
John
findTarget(): 2
Enter your choice:
4

(2) Test Case 2:
Select one of the following options:
1: readNames()()
2: findTarget()
3: printNames()
4: exit()
Enter your choice:
1
Enter size:
5
Enter 5 names:
Peter Paul John Mary Vincent
Enter your choice:
2
Enter target name:
Jane
findTarget(): -1
Enter your choice:
4

(3) Test Case 3:
Select one of the following options:
1: readNames()()
2: findTarget()
3: printNames()
4: exit()
Enter your choice:
1
Enter size:
5
Enter 5 names:
Peter Paul John Mary Vincent

```
Enter your choice:
3
Peter Paul John Mary Vincent
```

(4) Test Case 4:

```
Select one of the following options:
1: readNames()()
2: findTarget()
3: printNames()
4: exit()
Enter your choice:
1
Enter size:
6
Enter 6 names:
Peter Paul John Mary Vincent Joe
Enter your choice:
2
Enter target name:
Joe
findTarget(): 5
Enter your choice:
4
```

Practice Questions

3. (**palindrome**) Write a function palindrome() that reads a character string and determines whether or not it is a palindrome. A palindrome is a sequence of characters that reads the same forwards and backwards. For example, "abba" and "abcba" are palindromes, but "abcd" is not. The function returns 1 if it is palindrome, or 0 if otherwise. The function prototype is given as follows:

```
int palindrome(char *str);
```

A sample program template is given below for testing the function:

```
#include <stdio.h>
#include <string.h>
#define INIT_VALUE -1000
int palindrome(char *str);
int main()
{
  char str[80], *p;
  int result = INIT_VALUE;

  printf("Enter a string: \n");
  fgets(str, 80, stdin);
  if (p=strchr(str,'\n')) *p = '\0';
```

```
  result = palindrome(str);
  if (result == 1)
    printf("palindrome(): A palindrome\n");
  else if (result == 0)
    printf("palindrome(): Not a palindrome\n");
  else
    printf("An error\n");
  return 0;
}
int palindrome(char *str)
{
  /* Write your code here */
}
```

Some test input and output sessions are given below:

(1) Test Case 1:
Enter a string:
abcba
palindrome(): A palindrome

(2) Test Case 2:
Enter a string:
abba
palindrome(): A palindrome

(3) Test Case 3:
Enter a string:
abcde
palindrome(): Not a palindrome

(4) Test Case 4:
Enter a string:
abb a
palindrome(): Not a palindrome

```
#include <stdio.h>
#include <string.h>
#define INIT_VALUE -1000
int palindrome(char *str);
int main(){
   char str[80],*p;
   int result = INIT_VALUE;

   printf("Enter a string:\n");
   gets(str);
   result = palindrome(str);
   if(result ==1)
      printf("palindrome(): A
palindrome\n");
   else if(result ==0)
      printf("palindrome(): Not a
palindrome\n");
   else
      printf("An error\n");
   return 0;
}

int palindrome(char *str)
{
   int i,len,nlen;
   len = strlen(str);
   if(len%2==0)
   {
      nlen = len/2;
   }
   else
      nlen = (len-1)/2;

   for(i=0; i<nlen; i++)
   {
      if(str[i]==str[len-1-i])
      {    continue;}
      else
         return 0;
   }
   return 1;
}
```

```
int palindrome(char *str)
{
int len, i;
char *p1, *p2;
i=0; len=0;
while (*(str+i)!='\0') {
      i++; len++;
}
p1 = str;
p2 = str+len-1;
while (p1 < p2){
      if (*p1 != *p2)
            break;
      else {
           p1++; p2--;
            }
}
if (p1 < p2) return 0;
else return 1;
}
```