MAJOR QUIZ duration: **12:00- 12:45 PM (11-Sep)**

On Tuesday, 8th Sep @ 2:15 PM

B1,B2,B3 (Monday Lab Batch):

Reporting at **Computer Center Lab CC L2**

B4,B5,B6 (Tuesday Lab Batch):

Reporting at **New Core Labs**

LabExam today, Wed, 9th Sep @ 2:15 PM

B7,B8,B9 (Thursday Lab Batch):

Reporting at **Computer Center Lab CC L2 / 3**

B10,B11,B12 (Wednesday Lab Batch):

Reporting at **New Core Labs**

Reading a line as an input

- scanf, when used with the %s placeholder, reads a block of non-whitespace characters as a string.
- What if we want to read a line as a string?
- We will define our own function to read a line.
- **EXERCISE:** Take as input a line (that ends with the newline character) into a character array as a string.

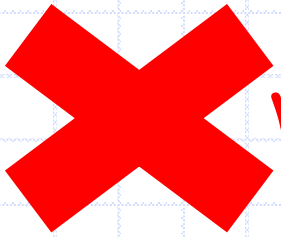
```
#include <stdio.h>
// read a line into str, return length.
//   maximum allowed length is limit
int read_line(char str[], int limit ) {
    int c, i=0;
    c = getchar();
    while (c != '\n' && c != EOF) {
        str[i] = c;
        c = getchar();
        i++;
        if (i == limit-1) break;
    }
    str[i] = '\0'; // we want a string!
    return i; // i is the length of the string
}
```

Safer version!

Copying one String to Other

- We can not copy content of one string variable to other using assignment operator

```
char str1[] = "Hello";
char str2[] = str1;
```



Array type is not assignable.

C Pointers needed!

  - This is true for any array variable.
  - Error: Array initializer must be a list or a string.
- We need to do element-wise copying

String Copy

str_copy(char dest[], char src[]);

- Arguments: Two strings: dest and src.
- Copy contents of src into dest.
- We assume that dest is declared with size at least as large as src.
- Note the use of '\0' for loop termination

```
void str_copy(char dest[], char src[]) {
    int i;
    for (i = 0; src[i] != '\0'; i++)
        dest[i] = src[i];
    dest[i] = '\0';
}
```

Comparing Two Strings

- Lexicographical Ordering
  - A string str1 is said to be lexicographically smaller than another string str2 if the first character, where the strings differ, is smaller in str1.
- Examples:
  - "cap" is smaller than "cat".
  - "mat" is smaller than "matter".
- Order of words in a Dictionary

Or, ASCII value.

String Comparison

- We will write a function that compares two strings lexicographically:

  str_compare (char str1[], char str2[])

- Arguments: Two strings str1 and str2
- Return value:
  - 0 if the strings are equal,
  - -1 if str1 is "smaller",
  - 1 if str2 is "smaller".
- Assumption: The strings contain letters of one case (either capital or small).

Code for str_compare

```
int str_compare(char str1[], char str2[]){
  int i=0;
  while (str1[i]==str2[i]){//skip over same chars
    if (str1[i]=='\0')
      break;
    i++;
  }
  if (str1[i] == str2[i])
    return 0;
  else if (str1[i] < str2[i])
    return -1;
  else //str2 < str1
    return 1;
}
```

When can this happen?

At this point, since the first differing characters are such that str1[i] < str2[i], => str1 is smaller

Other string functions

- Return *length* of a string.
- *Concatenates* one string with another.
- Search for a *substring* in a given string.
- *Reverse* a string
- Find first/last/k-th occurrence of a *character* in a string
  - … and more
- Case sensitive/*insensitive* versions

string.h

- Header File with Functions on Strings
- strlen(s): returns length of string s (without '\0')
- strcpy(d, s): copies s into d
- strcat(d, s): appends s at the end of d ('\0' is moved to the end of result)

string.h

- strcmp(s1, s2): return an integer less than, equal to, or greater than zero if s1 is found, respectively, to be less than, to match, or be greater than s2.

- Example:

```
char str1[] = "Hello", str2[] = "Helpo";
int i = strcmp(str1,str2);
printf("%d", i);
```

- Prints the value 'l'-'p' which is -4.

string.h

- strncpy(d, s, n)
- strncat(d, s, n)
- strncmp(d, s, n)
  - restrict the function to "n" characters at most (argument n is an integer)
  - first two functions-- Truncate the string s to the first "n" characters.
  - third function-- Truncate the strings d, s to the first "n" characters.

```
char str1[] = "Hello", str2[] = "Helpo";
printf("%d",strncmp(str1,str2,3));
```

0

string.h

- strcasecmp, strncasecmp:

  case insensitive comparison.

- Example:

```
char str1[] = "HELLO", str2[] = "Helpo";
int i = strcmp(str1,str2);
int j = strcasecmp(str1,str2);
printf("%d %d", i, j);
```

```
-1 -4
```

- strcmp gives -1 because 'E' < 'e' .
  - 'E'-'e' = -32 .

string.h

- Many more utility functions.

- strupr(s) : converts lower to upper case.
- strlwr(s) : converts upper to lower case.
- strstr(S,s) : searches s in S. Returns a pointer to the first occurrence.

- All functions depend on '\0' as the end-of-string marker.

Class Quiz- Arrays

- Execute the following?

```
int i;
scanf("%d",&i);
int a[i];
```

The program compiles in ITS.

Not allowed in standard C.

- Output?

```
char a[10] = { } ;
char b[2] ;
b[a[0]] = a[a[0]] ;
printf("%c %d", b[0], b[0]);
```

0