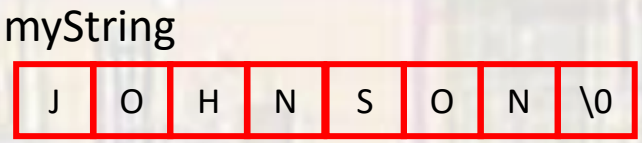
Strings

Last updated 5/18/21

Strings

- Strings in C
  - A string is a data structure used to treat a series of characters as a single unit
  - C strings are “delimited” strings
    - Use a delimiter to indicate the end of the string
    - The name of the string is a pointer to the first character in the string – just like an array
    - C uses the ASCII null character as its delimiter ‘\0’



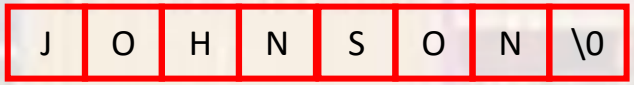
Strings

- Strings in C - memory
  - An array

myArray

  - A string

myString



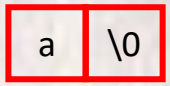
Strings

- Strings in C
  - String Literal (string constant)
    - Characters enclosed in double quotes

“hello world”
“my string literal”

character ‘a’

string “a”



empty string “” note: no space

Strings

- Strings in C
  - String Literal (string constant)
    - Characters enclosed in double quotes
    - We can access the individual elements of a string literal

    “hello world”

    “hello world”[3] → l

    “hello world”[6] → w

    “hello world”[11] → \0

Strings

- Strings in C
  - Declaration

```
char myString[12];
```

  - String size must be 1 byte larger than the largest allowed value (to hold the delimiter)

Strings

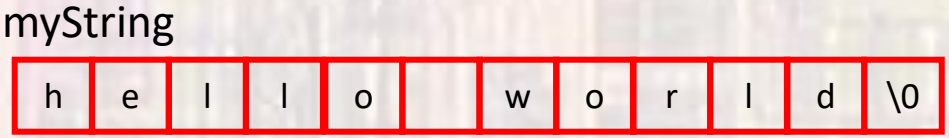
- Strings in C
  - Initialization

```
char myString[12] = “hello world”;

char myString[] = “hello world”;

char myString[12] = {‘h’, ‘e’, ‘l’, ‘l’, ‘o’,’ ‘,
                     ‘w’, ‘o’, ‘r’, ‘l’, ‘d’, ‘\0’};
```

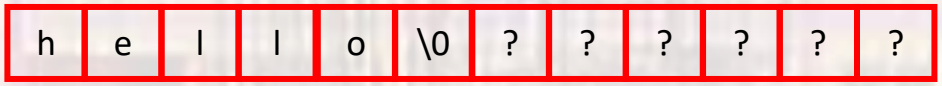
Strings

- Strings in C
  - Initialization

char myString[12] = “hello world”;



char myString[12] = “hello”;



Strings

- Strings in C
  - Assignment
    - Just like arrays, strings cannot be assigned as a whole entity
    - Must assign element by element

Strings

- Strings in C
  - Both Array notation and Pointer notation work

```c
/*
 * strings.c
 *
 *  Created on: Jan 23, 2018
 *      Author: johnsontimoj
 */

#include <stdio.h>

#define N 5

int main(void){
    setbuf(stdout, NULL);  // disable buffering

    // local variables
    char my_string[17] = "this is a string";
    char* str_ptr;
    str_ptr = my_string;

    // print some values
    printf("my_string[5] is %c\n", my_string[5]);
    printf("char at str_ptr + 6 is %c", *(str_ptr + 6));

    return 0;
} // end main
```

Array notation

pointer notation

Value of my_string (ptr)

(x)= Variables | Breakpoints | Expressions

Name	Type	Value	Location
my_string	char [17]	0x61ff0b	0x61ff0b
(x)= my_string[0]	char	116 't'	0x61ff0b
(x)= my_string[1]	char	104 'h'	0x61ff0c
(x)= my_string[2]	char	105 'i'	0x61ff0d
(x)= my_string[3]	char	115 's'	0x61ff0e
(x)= my_string[4]	char	32 ' '	0x61ff0f
(x)= my_string[5]	char	105 'i'	0x61ff10
(x)= my_string[6]	char	115 's'	0x61ff11
(x)= my_string[7]	char	32 ' '	0x61ff12
(x)= my_string[8]	char	97 'a'	0x61ff13
(x)= my_string[9]	char	32 ' '	0x61ff14
(x)= my_string[10	char	115 's'	0x61ff15
(x)= my_string[11	char	116 't'	0x61ff16
(x)= my_string[12	char	114 'r'	0x61ff17
(x)= my_string[13	char	105 'i'	0x61ff18
(x)= my_string[14	char	110 'n'	0x61ff19
(x)= my_string[15	char	103 'g'	0x61ff1a
(x)= my_string[16	char	0 '\0'	0x61ff1b
str_ptr	char *	0x61ff0b "this is a str...	0x61ff1c
(x)= *str_ptr	char	116 't'	0x61ff0b

Characters – 1B each

ptr to my_string[0]

Terminator '\0'

```
<terminated> (exit value: 0) Class_C
my_string[5] is i
char at str_ptr + 6 is s
```

Note: this uses a different IDE to show debug values

Strings

- Strings in C
  - There is a large collection of string functions included in C distributions