

Strings

# Advanced C

S\_\_\_\_\_s - Fill in the blanks please ;)



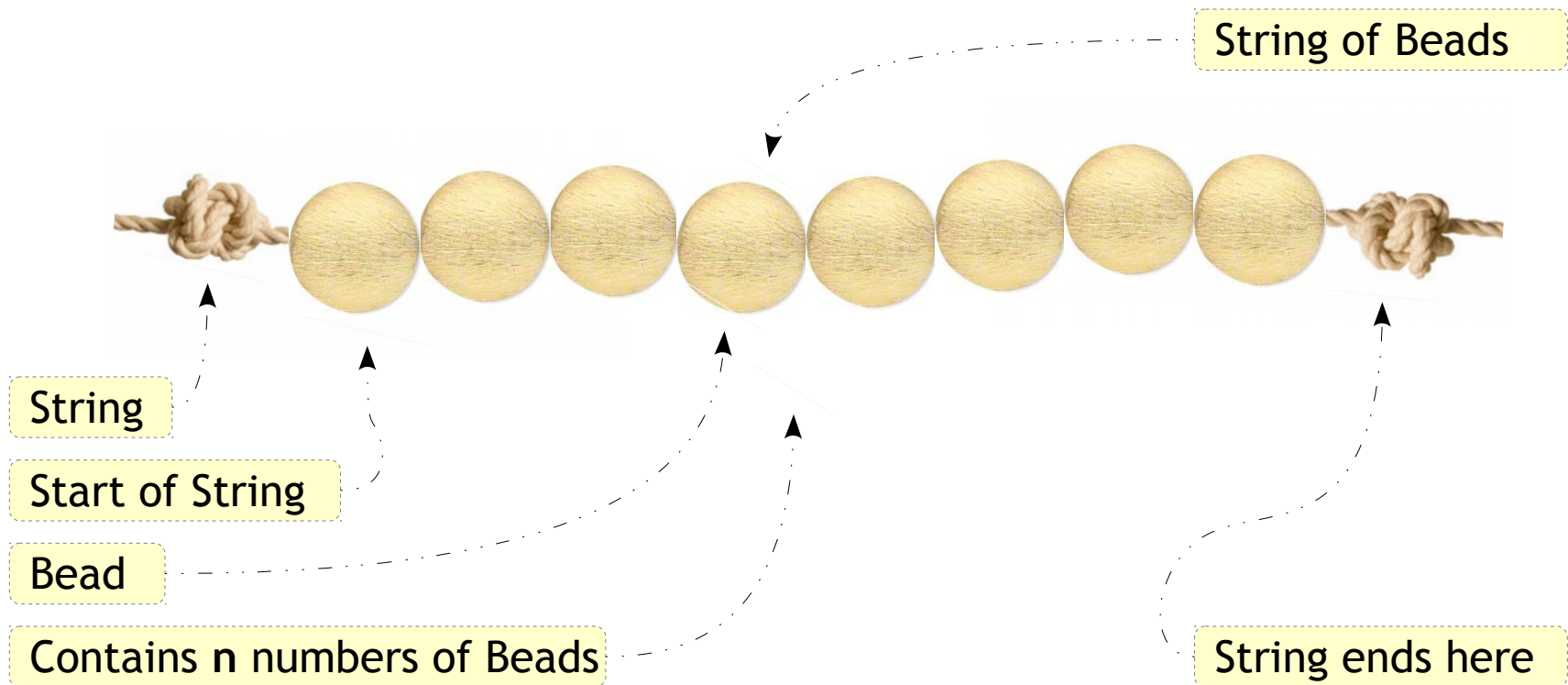
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## Strings



A set of things tied or threaded together on a thin cord

Source: Google



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## Strings



- Contiguous sequence of characters
- Stores printable ASCII characters and its extensions
- End of the string is marked with a special character, the null character '\0'
- '\0' is implicit in strings enclosed with “”
- Example

“You know, now this is what a string is!”

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## Strings



- Constant string
  - Also known as string literal
  - Such strings are read only
  - Usually, stored in read only (code or text segment) area
  - String literals are shared
- Modifiable String
  - Strings that can be modified at run time
  - Usually, such strings are stored in modifiable memory area (data segment, stack or heap)
  - Such strings are not shared

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## Strings - Initialization



001\_example.c

`char char_array[5] = {'H', 'E', 'L', 'L', 'O'};` ← Character Array

`char str1[6] = {'H', 'E', 'L', 'L', 'O', '\0'};` ← String

`char str2[] = {'H', 'E', 'L', 'L', 'O', '\0'};` ← Valid

`char str3[6] = {"H", "E", "L", "L", "O"};` ← Invalid

`char str4[6] = {"H" "E" "L" "L" "O"};` ← Valid

`char str5[6] = {"HELLO"};` ← Valid

`char str6[6] = "HELLO";` ← Valid

`char str7[] = "HELLO";` ← Valid

`char *str8 = "HELLO";` ← Valid

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## Strings - Memory Allocation

### Example

```
char str1[] = {'H', 'E', 'L', 'L', 'O', '\\0'};
```

```
char *str2 = "Hello";
```

str1	
'H'	1000
'E'	1001
'L'	1002
'L'	1003
'O'	1004
'\\0'	1005

str2	
1000	996
?	997
?	998
?	999
'H'	1000
'E'	1001
'L'	1002
'L'	1003
'O'	1004
'\\0'	1005

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## Strings - Size



### 002\_example.c

```
#include <stdio.h>

int main()
{
    char char_array_1[5] = {'H', 'E', 'L', 'L', 'O'};
    char char_array_2[] = "Hello";

    sizeof(char_array_1);
    sizeof(char_array_2);

    return 0;
}
```

The size of the array  
is calculated so,

5, 6

### 003\_example.c

```
int main()
{
    char *str = "Hello";

    sizeof(str);

    return 0;
}
```

The size of pointer  
is always constant  
so,  
4 (32 Bit Sys)



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## Strings - Size



004\_example.c

```
#include <stdio.h>

int main()
{
    if (sizeof("Hello" "World") == sizeof("Hello") + sizeof("World"))
    {
        printf("WoW\n");
    }
    else
    {
        printf("HuH\n");
    }

    return 0;
}
```

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## Strings - Manipulations



005\_example.c

```
#include <stdio.h>

int main()
{
    char str1[6] = "Hello";
    char str2[6];

    str2 = "World";

    char *str3 = "Hello";
    char *str4;

    str4 = "World";

    str1[0] = 'h';
    str3[0] = 'w';

    printf("%s\n", str1);
    printf("%s\n", str2);

    return 0;
}
```

Not possible to assign a string to a array since its a constant pointer

Possible to assign a string to a pointer since its variable

Valid. str1 contains "hello"

Invalid. str3 might be stored in read only section.  
Undefined behaviour

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## Strings - Sharing



006\_example.c

```
#include <stdio.h>

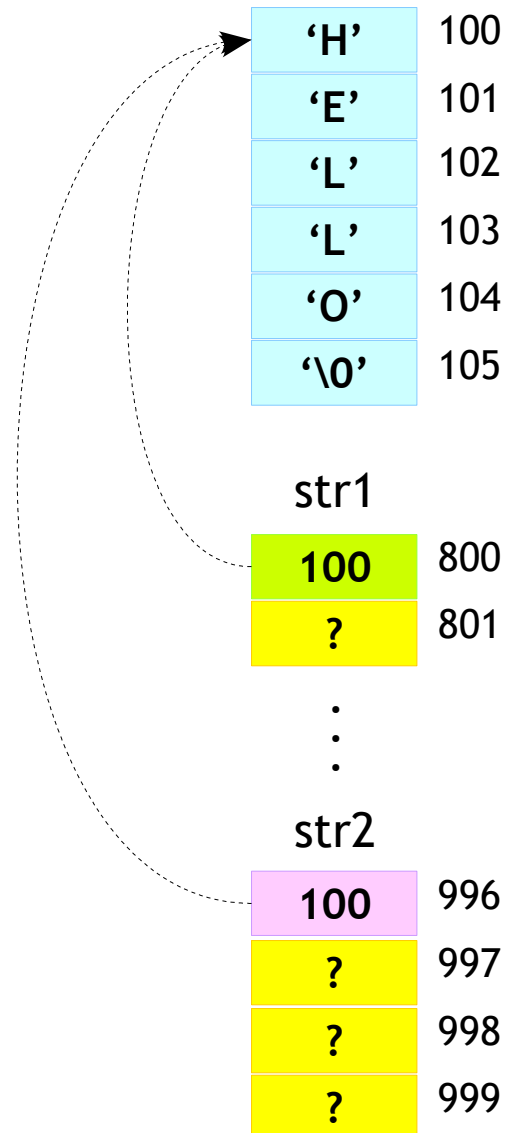
int main()
{
    char *str1 = "Hello";
    char *str2 = "Hello";

    if (str1 == str2)
    {
        printf("Hoo. They share same space\n");
    }
    else
    {
        printf("No. They are in different space\n");
    }

    return 0;
}
```

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## Strings - Sharing



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## Strings - Empty String



007\_example.c

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

int main()
{
    char *str = "";
    int ret;

    ret = strlen(str);
    printf("%d\n", ret);

    return 0;
}
```

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## Strings - Passing to Function



008\_example.c

```
#include <stdio.h>

void print(const char *str)
{
    while (*str)
    {
        putchar(*str++);
    }
}

int main()
{
    char *str = "Hello World";

    print(str);

    return 0;
}
```

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## Strings - Reading



009\_example.c

```
#include <stdio.h>

int main()
{
    char str[6];

    gets(str);
    printf("The string is: %s\n", str);

    return 0;
}
```

- The above method is not recommended by the gcc. Will issue warning while compilation
- Might lead to stack smashing if the input length is greater than array size!!

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## Strings - Reading



010\_example.c

```
#include <stdio.h>

int main()
{
    char str[6];

    fgets(str, 6, stdin);
    printf("The string is: %s\n", str);

    scanf("%5[^\n]", str);
    printf("The string is: %s\n", str);

    return 0;
}
```

- fgets() function or selective scan with width are recommended to read string from the user



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## Strings - DIY



- WAP to calculate length of the string
- WAP to copy a string
- WAP to compare two strings
- WAP to compare two strings ignoring case
- WAP to check a given string is palindrome or not

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## Strings - Library Functions



Purpose	Prototype	Return Values
Length	<code>size_t strlen(const char *str)</code>	String Length
Compare	<code>int strcmp(const char *str1, const char *str2)</code>	$str1 < str2 \rightarrow < 0$ $str1 > str2 \rightarrow > 0$ $str1 = str2 \rightarrow = 0$
Copy	<code>char *strcpy(char *dest, const char *src)</code>	Pointer to dest
Check String	<code>char *strstr(const char *haystack, const char *needle)</code>	Pointer to the beginning of substring
Check Character	<code>char *strchr(const char *s, int c)</code>	Pointer to the matched char else NULL
Merge	<code>char *strcat(char *dest, const char *src)</code>	Pointer to dest

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## Strings - Quiz



- Can we copy 2 strings like, `str1 = str2`?
- Why don't we pass the size of the string to string functions?
- What will happen if you overwrite the `'\0'` (null character) of string? Will you still call it a string?
- What is the difference between `char *s` and `char s[]`?

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## Strings - DIY



- WAP to reverse a string
- WAP to compare string2 with string1 up to n characters
- WAP to concatenate two strings

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## Strings - DIY



- Use the standard string functions like
  - strlen
  - strcpy
  - strcmp
  - strcat
  - strstr
  - strtok

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## Strings - DIY



- WAP to print user information -
  - Read : Name, Age, ID, Mobile number
  - Print the information on monitor
  - Print error “Invalid Mobile Number” if length of mobile number is not 10
- WAP to read user name and password and compare with stored fields. Present a puzzle to fill in the banks
- Use strtok to separate words from string “www.emertxe.com/bangalore”