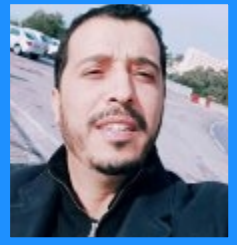
Algorithms and Data Structure 01



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Chapter 05 String data type

Textual data are very inportant in computer science :

- Many real world information are text.
  - Persons Names,
  - Cities' names,
  - Description,
  - Email,
  - password
  - Social media communication and posts.
  - Software source code.!,
  - Date

How textual data are represented in the computer memory ?

The computer can only store and process numeric data in binary format, to be able to process textual data it needs to be “coded” , this mean that each char is given a numerical value. There are many : ASCI is the oldest, UNICODE is the most recent since it can handel any humain languages (arabic, mandarin etc.

How textual data are represented in the computer memory ?

Dec	Symbol	Binary	Dec	Symbol	Binary
65	A	0100 0001	83	S	0101 0011
66	B	0100 0010	84	T	0101 0100
67	C	0100 0011	85	U	0101 0101
68	D	0100 0100	86	V	0101 0110
69	E	0100 0101	87	W	0101 0111
70	F	0100 0110	88	X	0101 1000
71	G	0100 0111	89	Y	0101 1001
72	H	0100 1000	90	Z	0101 1010
73	I	0100 1001	91	[	0101 1011
74	J	0100 1010	92	\	0101 1100
75	K	0100 1011	93	]	0101 1101
76	L	0100 1100	94	^	0101 1110
77	M	0100 1101	95	_	0101 1111
78	N	0100 1110	96	`	0110 0000
79	O	0100 1111	97	a	0110 0001
80	P	0101 0000	98	b	0110 0010
81	Q	0101 0001	99	c	0110 0011
82	R	0101 0010	100	d	0110 0100

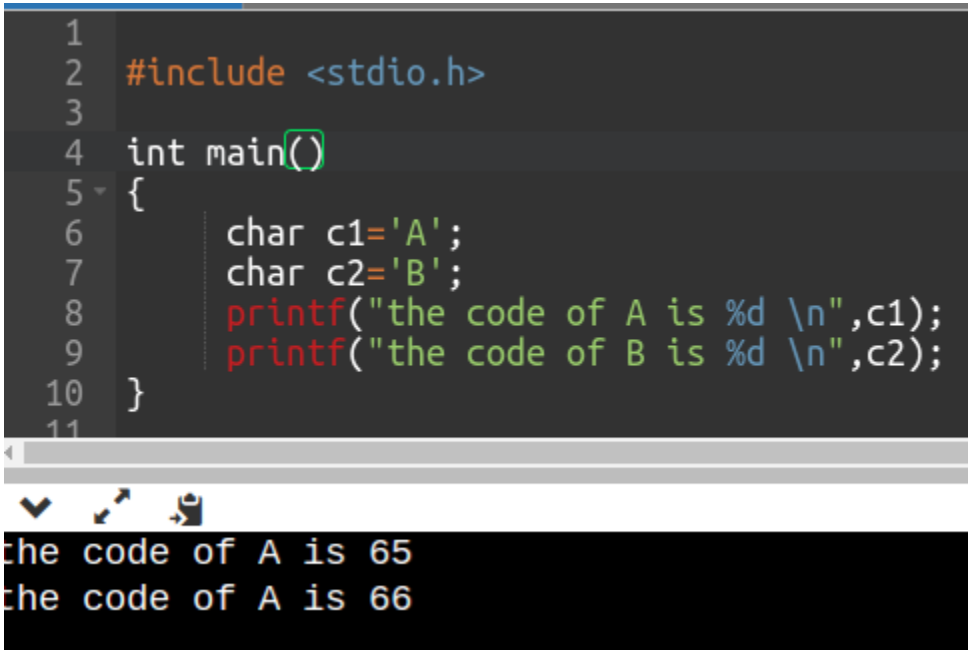
How textual data are represented in the computer memory ?

Many computer programming language have their own type for textual data : String in java, str in python, etc.

The C computer language don’t have a data type for text, thus it uses an **array of chars**.

The array must end of special char

\0 known as the null char.



How textual data are represented in the computer memory ?

```
char capital[7];  // Delare a string of 10 chars.
char nom[ 7]="ANNABA\0";  // Delare a string of 7 chars and intialise it.
```

```
C TextualData.c > main()
1   #include<stdio.h>
2   int main(){
3       char nom[7]={'a','l','g','i','e','s','\0'};
4       char ville[7]="Annaba\0";
5       printf("\n %s \n ",nom);
6       printf("\n %s \n ",ville);
7   }
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  cppd

algies

Annaba
```

\0 the char to mark the end of the word.

How textual data are represented in the computer memory ?

A string is simply a array of chars, we can use loop to visit each cell of it as follow :

```c
#include<stdio.h>
int main(){
    char name[13]="Badji Mokhtar";
    for(int i=0;i<13;i++){
        printf(" %c  ",name[i]);
    }
    printf("\n");
}
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
B   a   d   j   i       M   o   k   h   t   a   r
```

Demo #2

Write an algorithm wich iterates on each cell of a string and count the number of occurrence of specific char.

```c
#include<stdio.h>
int main(){
    char name[13]="Badji Mokhtar";
    for(int i=0;i<13;i++){
        printf(" %c  ",name[i]);
    }
    printf("\n");
}
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
B   a   d   j   i       M   o   k   h   t   a   r
```

How textual data are represented in the computer memory ?

```c
#include<stdio.h>
int main(){
    char name[20];
    printf("Please enter the text (length < 20) :");
    scanf("%s",&name);
    char c='a';
    int counter=0;
    int i=0;
    while(name[i]!='\0'){
        if(name[i]==c)counter=counter+1;
        i=i+1;
    }
    printf("\nThe number of occurence of %c  in  the text is : %d",counter);
    }
```

Sepcial character

Escape character	Result	Description
\'	'	Single quote
\"	"	Double quote
\\	\	Backslash

Escape Character	Result
\n	New Line
\t	Tab
\0	Null

#include <string.h>

strlen(str) // length of a string

strcat(str1, str2) // concatenate two strings

strcpy(str2, str1); // copy a string into another string

strcmp(str1, str2); // comparing strings

string.h is library wich contains many string related functions, such as : counting the length of a string, concatening a string, comparing strins.

#include <string.h>

```
1   #include<stdio.h>
2   #include<string.h>
3   int main(){
4       char text[100]="Annaba is beautiful city!";
5       int i=0;
6       while(text[i]!='\0'){
7           i=i+1;
8       }
9       int length=strlen(text);
10      printf("\n using strlen %d \n",length);
11      printf("\n using our loop %d \n",i);
12
13  }
```