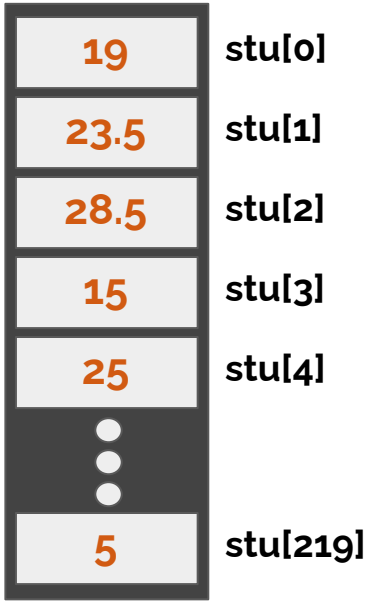
# String as Arrays

# Arrays: Review

Now we have data in the stu[220] float array, we want to print Passed or Failed based on student performance.
Condition is: If the marks are greater than 15 print marks and write Passed Otherwise Failed.

How to do it ?



# Arrays: Review

```
#include <iostream>
using namespace std;
string result(float number)
{
    string grade;
    if (number > 15){
        grade = "Passed";
    }
    else{
        grade = "Failed";
    }
    return grade;
}
main(){
    float stu[220];
    for(int x = 0; x < 220; x = x+1){
        cin >> stu[x];
    }
    for(int idx = 0; idx < 220; idx = idx + 1){
        string  grade = result(stu[idx]);
        cout << stu[idx] << ": " << grade << endl;
    }
}
```

# Working Example: Updated

Now the requirement is to check if a specific character is present in the string entered by the user or not.

```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
Enter a Word: programming
Enter the character you want to find: m
m is found in programming
```

```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
Enter a Word: programming
Enter the character you want to find: l
l is not found in programming
```

Using the previous knowledge, can we take the input in string datatype or we have to use some array?

# String

Before moving to the solution, lets see a simple program.

```
#include <iostream>
using namespace std;
main(){

    string word = "C++";

}
```

# String

Can we do something like this?

```
#include <iostream>
using namespace std;
main(){

    string word = "C++";
    cout << word[0];

}
```

# String

Can we do something like this? Lets see the Output.

```cpp
#include <iostream>
using namespace std;
main(){

    string word = "C++";
    cout << word[0];

}
```

```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
C
```

# String

Can we do something like this? Lets see the Output.

```
#include <iostream>
using namespace std;
main(){

    string word = "C++";
    cout << word[2];

}
```

```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
+
```

# String

Can we do something like this? Lets see the Output.

```
#include <iostream>
using namespace std;
main(){

    string word = "C++";
    cout << word[3];

}
```

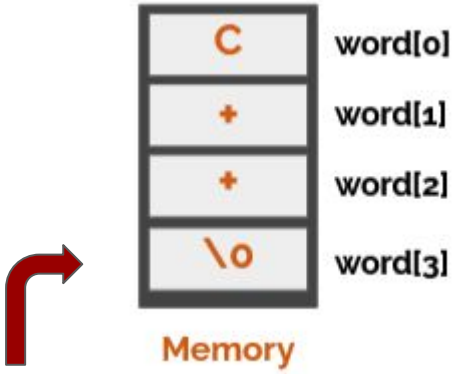
```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
```

# String: Char Array

It means, C++ considers string as Character Array.

```
#include <iostream>
using namespace std;
main(){

    string word = "C++";
    cout << word[3];

}
```

Although "C++" has 3 characters, the null character '\0' is added to the end of the string automatically.

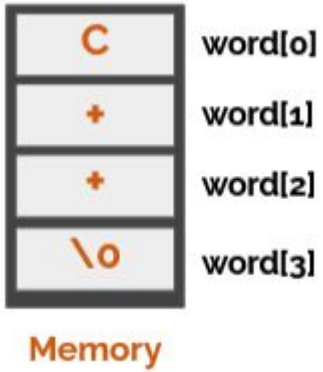



Char arrays are terminated with a null character, that is '\0'.

# String: Char Array (Initialization)

Different ways of initializing string or character array.

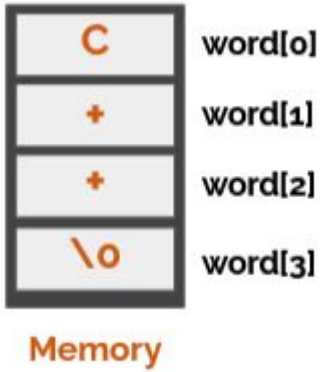
```
string word = "C++";
```



# String: Char Array (Initialization)

Different ways of initializing string or character array.

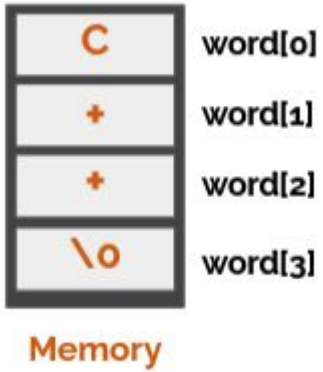
```
string word = "C++";

char word[4] = "C++";
```



# String: Char Array (Initialization)

Different ways of initializing string or character array.

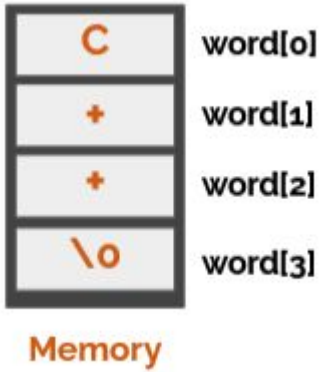
```
string word = "C++";

char word[4] = "C++";

char word[] = "C++";
```



# String: Char Array (Initialization)

Different ways of initializing string or character array.

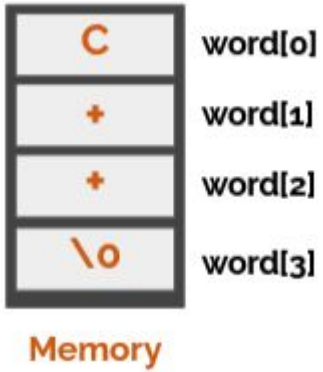
```
string word = "C++";

char word[4] = "C++";

char word[] = "C++";

char word[] = {'C','+','+','\0'};
```



# String: Char Array (Initialization)

Different ways of initializing string or character array.

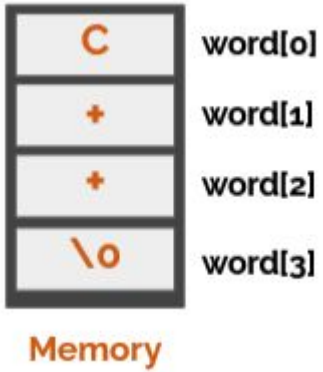
```
string word = "C++";

char word[4] = "C++";

char word[] = "C++";

char word[] = {'C','+','+','\0'};

char word[4] = {'C','+','+','\0'};
```



# String: Char Array (Initialization)

Different ways of initializing string or character array.

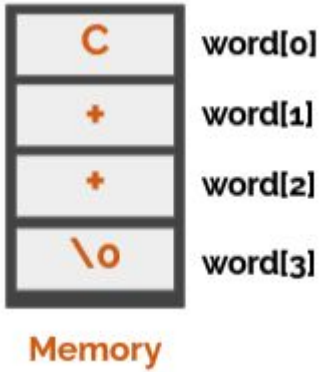
```
string word = "C++";

char word[4] = "C++";

char word[] = "C++";

char word[] = {'C','+','+','\0'};

char word[4] = {'C','+','+','\0'};

char word[4] = {'C','+','+'};
```



# String: Char Array (Initialization)

Different ways of initializing string or character array.

```
string word = "C++";

char word[4] = "C++";

char word[] = "C++";

char word[] = {'C','+','+','\0'};

char word[4] = {'C','+','+','\0'};

char word[4] = {'C','+','+'};

char word[100] = "C++";
```

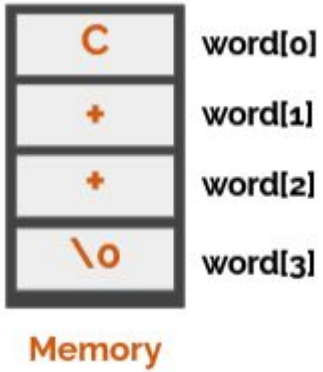


# String: Char Array (Initialization)

Different ways of initializing string or character array.

Easy ones.

```
string word = "C++";
char word[4] = "C++";
char word[] = "C++";
char word[] = {'C','+','+','\0'};
char word[4] = {'C','+','+','\0'};
char word[4] = {'C','+','+'};
char word[100] = "C++";
```



# String: Char Array (Output)

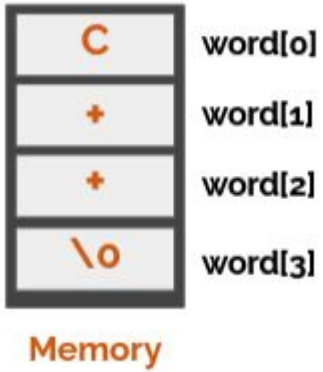
Different ways of displaying Output on the console using string or character array.

Method 1:

```
cout << word;
```

Method 2:

```
for (int idx = 0; word[idx] != '\0'; idx = idx + 1)
    {
        cout << word[idx];
    }
```



# String: Char Array (Output)

Different ways of displaying Output on the console using string or character array.

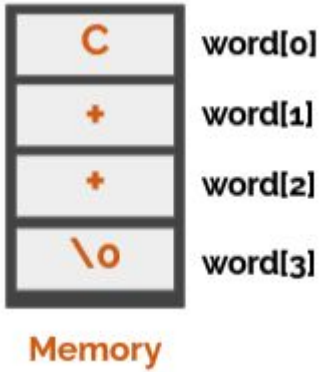
```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
C++
```

Method 1:

```
cout << word;
```

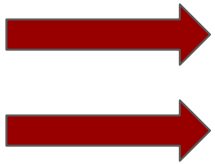
Method 2:

```
for (int idx = 0; word[idx] != '\0'; idx = idx + 1)
    {
        cout << word[idx];
    }
```



# String: Char Array (Input)

Simply take input in the string or char array as before.



```
string word
char word[100]
```

```
cin >> word;
```

# Back to Working Example

Now the requirement is to check if a specific character is present in the string entered by the user or not.

```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
Enter a Word: programming
Enter the character you want to find: m
m is found in programming
```

```
C:\C++>c++ example.cpp -o example.exe

C:\C++>example.exe
Enter a Word: programming
Enter the character you want to find: l
l is not found in programming
```

Using the previous knowledge, can we take the input in string datatype or we have to use some array?

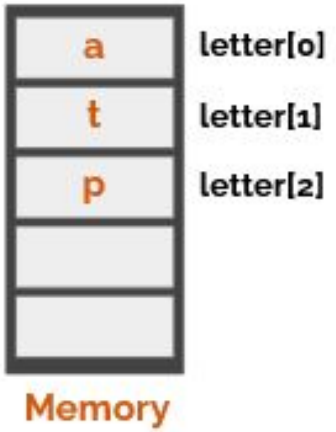
```
#include <iostream>
using namespace std;
bool check(string word, char letter)
{
  bool isFound = false;
  for(int idx = 0; word[idx] != '\0'; idx = idx + 1){
        if (word[idx] == letter){
            isFound = true;
            break;
        }
  }
  if (isFound == true){
        return 1;
  }
  else{
        return 0;
  }
}
```

```
main(){
    string word;
    char letter;
    cout << "Enter a Word: ";
    cin >> word;
    cout << "Enter the character you
want to find: ";
    cin >> letter;
    if(check(word, letter)){
        cout << letter << " is found in
" << word;
    }
    else{
        cout << letter << " is not
found in " << word;
    }
}
```

# Character Arrays in C++

We know Character values are stored using single quotes as shown below.

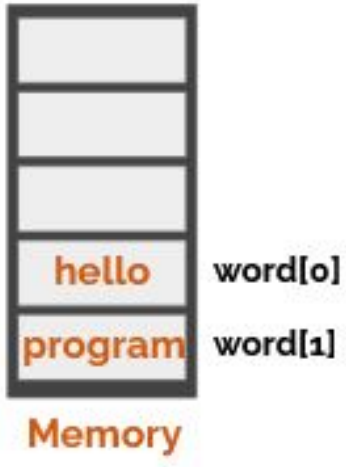
```
char letter[3] = {'a','t','p'};
```



# String Arrays in C++

Similarly, String values are stored using double quotes as shown below.

```
string word[2] = {"hello", "programming"};
```



# String Input: With Spaces

Previously, we encountered the error when we take input in string with a space then it gives us the error.

```
string sentence;
cin >> sentence;
```

# String Input: With Spaces

We can resolve this error by using the function getline.

```
string sentence;
getline(cin, sentence);
```

# Learning Objective

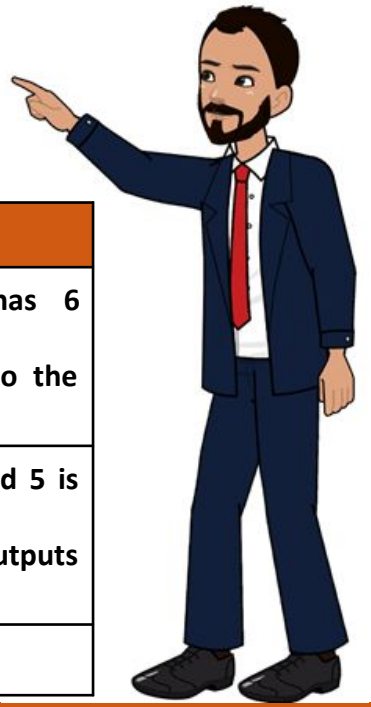
**Declare**, **initialize** and use **char arrays** to solve real world problems that needs relatively **large amount of data.**

# Conclusion

- Char arrays are a little different from int and float arrays.
- Char arrays are terminated with a null character, that is '\0'.
- In C++, character arrays are also called strings.

# Self Assessment

Write a C++ program that is given a string as input, it displays true if its length is even and false if the length is odd.



## Test Cases:

| Input | Output | Explanation |
|---|---|---|
| Enter a String: apples | true | // The word "apples" has 6 characters.<br>// 6 is an even number, so the program outputs true. |
| Enter a String: pears | false | // "pears" has 5 letters, and 5 is odd.<br>// Therefore the program outputs false. |
| Enter a String: cherry | true | |

# Self Assessment

Create a C++ program that takes a string (a random name). If the last character of the name is an ‘n’, it displays true, otherwise returns false.

Test Cases:

| Input | Output |
|---|---|
| Enter a String: Aiden | true |
| Enter a String: Piet | false |
| Enter a String: Bert | false |