Fundamentals of Programming: String Functions in C++

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Agenda

- Different ways to create strings
- String header file
- Using predefined string functions from string header

What is a string?

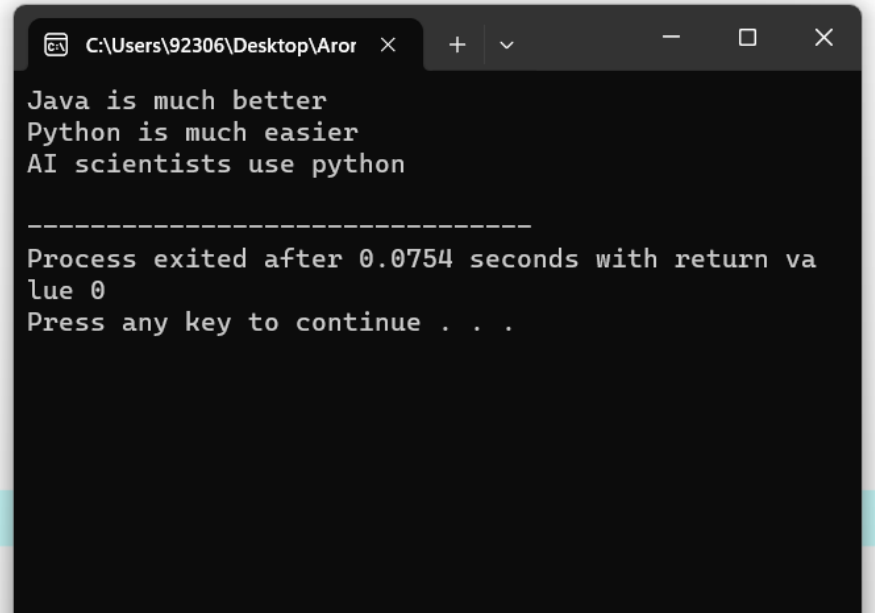
- Combination of two or more than two characters (alphanumeric)
- String is also called a character array
- “Java is much better than C++ version @11”

Libraries for strings in C++

#include<string> used to manipulate C++ strings

#include<cstring> used to manipulate C style strings

```
string s1("Java is much better");
cout<<s1<<endl;

char s2[]="Python is much easier";
cout<<s2<<endl;

string s3="AI scientists use python";
cout<<s3<<endl;
```

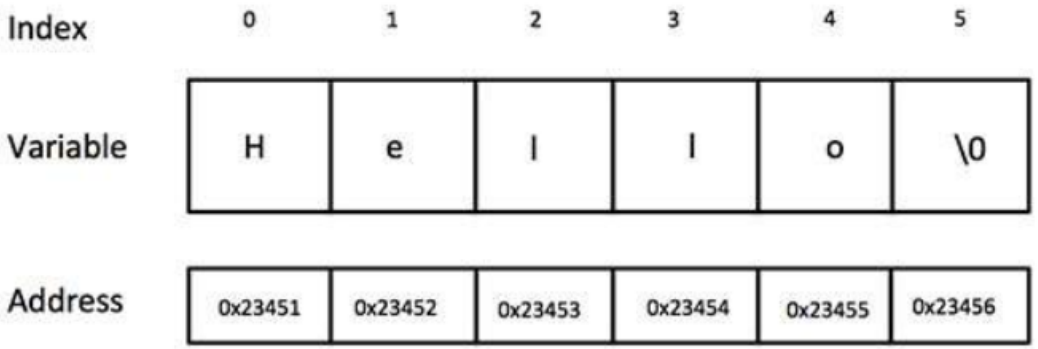


Different ways to create a string:

C STYLE STRINGS

```
char greeting[] = "Hello";
```

Following is the memory presentation of above defined string in C/C++ –

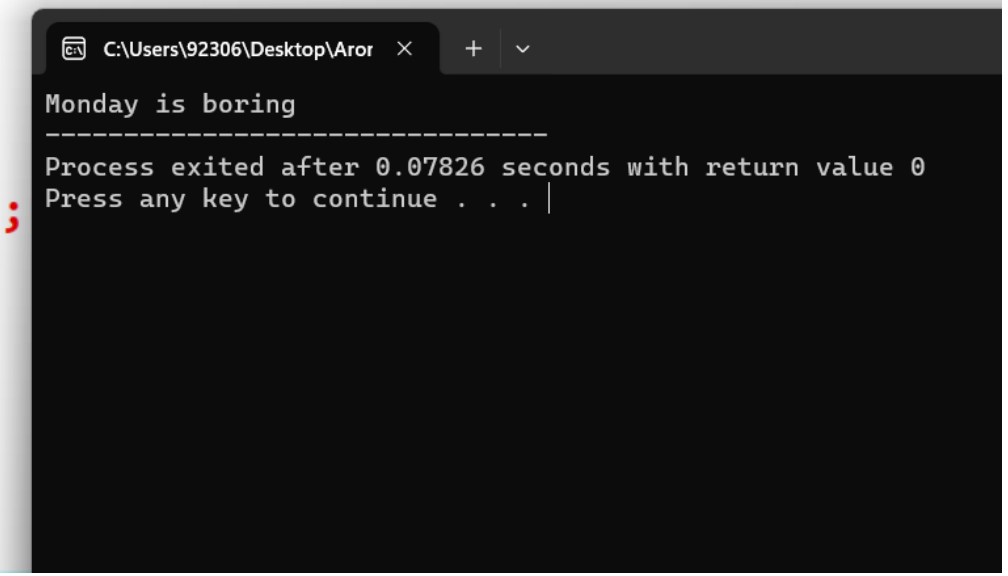


Actually, you do not place the null character at the end of a string constant. The C++ compiler automatically places the '\0' at the end of the string when it initializes the array. Let us try to print above-mentioned string –

1. strcpy()

- String copy function copies a string from source location to destination location
- strcpy(destination, source), available in cstring
- destination and source both must be character array strings.

```cpp
#include<string>
#include<cstring>
using namespace std;

int main(){
char src_str[17]="Monday is boring";
char dst_str[17];
strcpy(dst_str,src_str);
cout<<dst_str;

return 0;
}
```

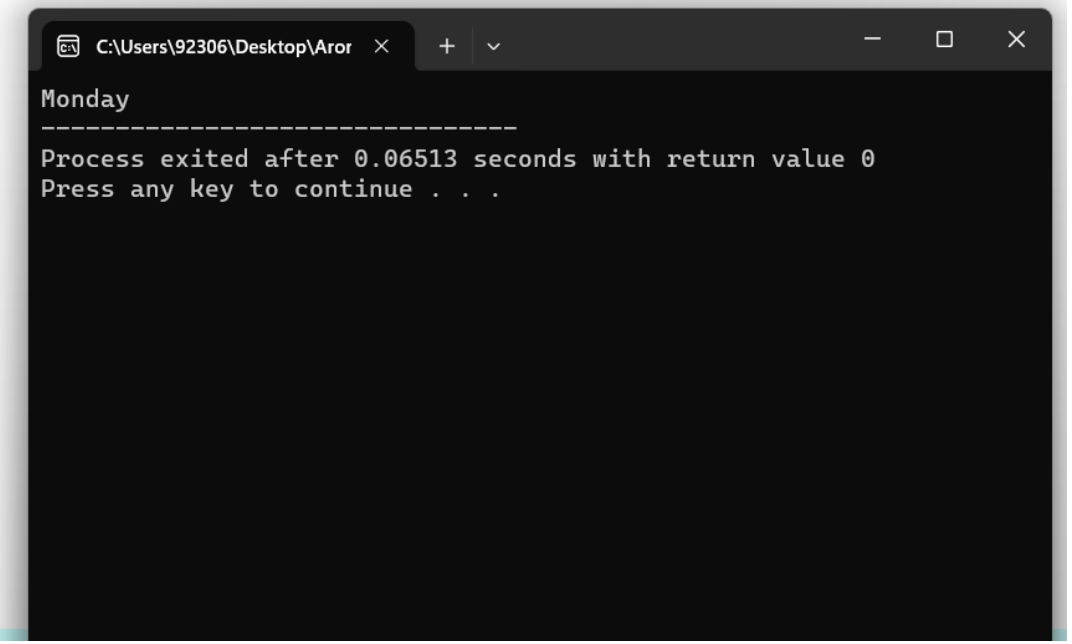


Example strcpy(), Why 17 characters

2. strncpy()

- Copies specified number of characters from source to destination
- strncpy(Destination, source, number)
- Available in cstring

```cpp
#include<cstring>
using namespace std;

int main(){
char str1[17]="Monday is boring";
char str2[7];
strncpy(str2,str1,7);
cout<<str2;
return 0;
}
```

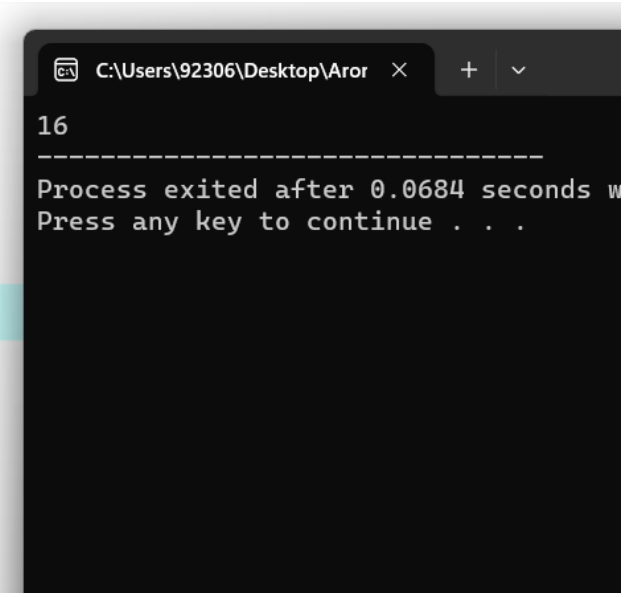


Example strncpy()

3. strlen()

- It finds the length (number of characters of a string)
- Available in cstring

```cpp
#include<iostream>
#include<cstring>
using namespace std;

int main(){
char str1[17]="Monday is boring";
cout<<strlen(str1);
return 0;
}
```



Example strlen()

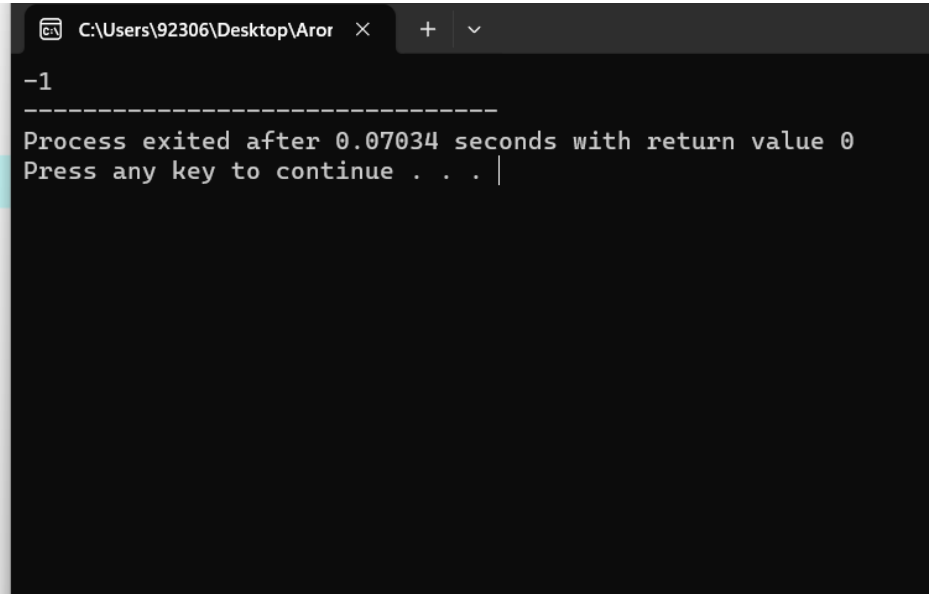
4. strcmp

- Compares two strings lexicographically (from left to right)
- Which string is greater alphabetically?
  - string a="Hi";
  - string b="He";

4. strcmp

- strcmp(lhs,rhs)
  - returns 1 if the first differing character in lhs is greater than rhs
  - returns -1 if the first differing character in lhs is smaller than rhs
  - returns 0 if both strings are equal

```cpp
#include<iostream>
#include<cstring>
using namespace std;

int main(){
char str1[3]="Me";
char str2[3]="Mo";
cout<<strcmp(str1,str2);
return 0;
}
```



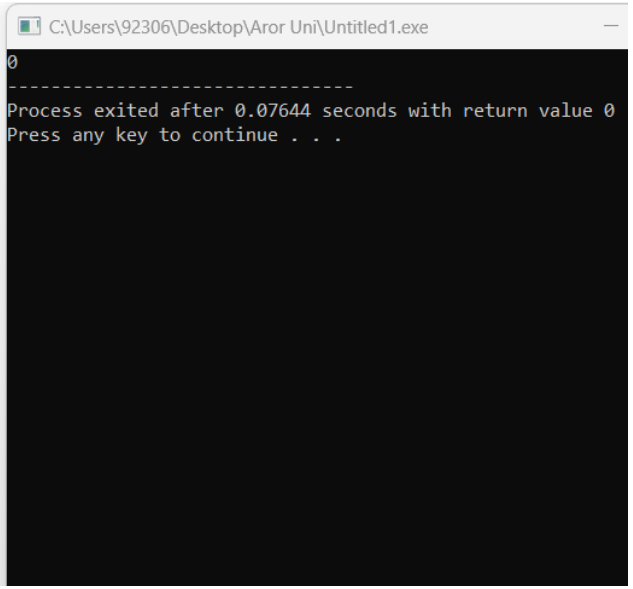
Example strcmp()

5.strncmp

- Compares n characters from lhs and rhs
- Other working is same as strcmp()
- Available in cstring

Example

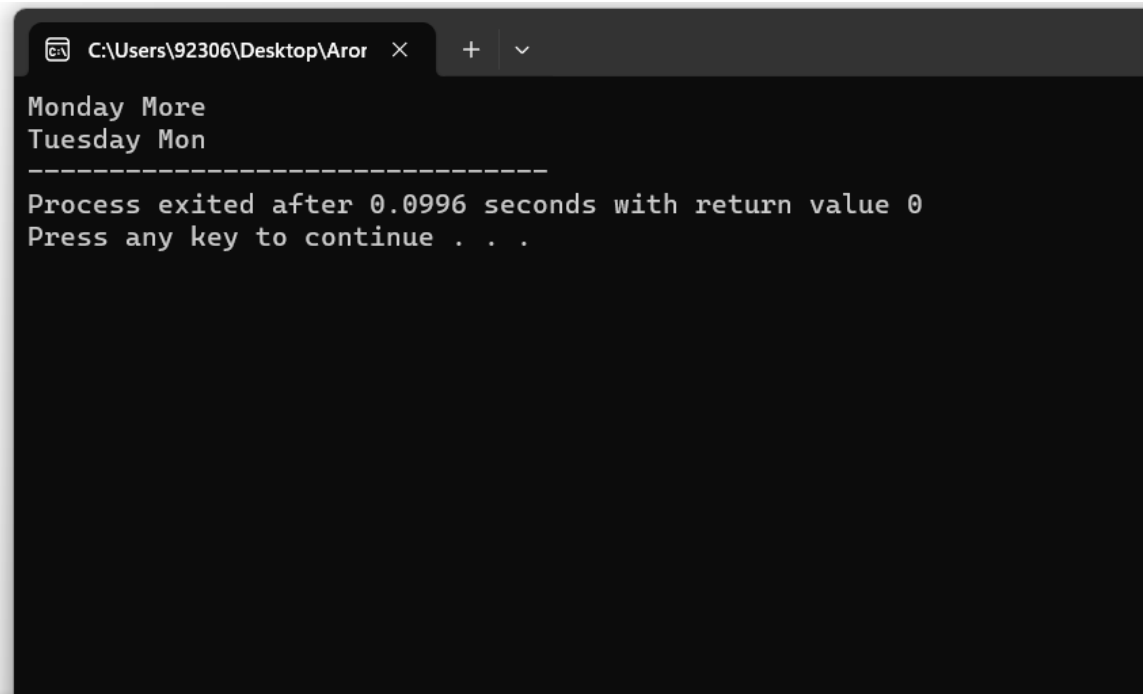
```
#include<iostream>
#include<cstring>
using namespace std;

int main(){

char s1[7]="Monday";
char s2[5]="More";

cout<<strncmp(s1,s2,2);
```



6. strcat() and strncat()

- strcat() Appends the contents of source string into destination string
- strncat() Appends the n characters from source string to destination string
- Available in cstring

```
int main(){

char s1[16]="Monday ";
char s2[5]="More";
char s3[12]="Tuesday ";
strcat(s1,s2);
strncat(s3,s1,3);
cout<<s1<<endl;
cout<<s3;

return 0;
}
```



Example

7. strtok()

- Tokenizes a string
- It takes a string and a delimeter
- Available in cstring

Code for printing all the tokens

```
#include <cstring>
#include <iostream>
using namespace std;

int main() {
  char str[] = "Remember me when you look at the moon!";
  char delim[] = " ";

  cout << "The tokens are:" << endl;

  // tokenize str in accordance with delim
  char *token = strtok(str,delim);

  // loop until strtok() returns NULL
  while (token)  {

    // print token
   cout << token << endl;

    // take subsequent tokens
    token = strtok(NULL,delim);
  }

  return 0;
}
```

8. strstr()

- Searches for first occurrence of source string in the destination string
- It takes two strings as parameters
- Available in cstring

```
#include <cstring>
#include <iostream>

using namespace std;

int main()
{
   char str[] = "Use your brain and heart";
   char target[] = "brain";
   char *p = strstr(str, target);

   if (p)
       cout << "'" << target << "' is present in \"" << str << "\" at position " << p-str;
   else
       cout << target << " is not present \"" << str << "\"";

   return 0;
```

Example

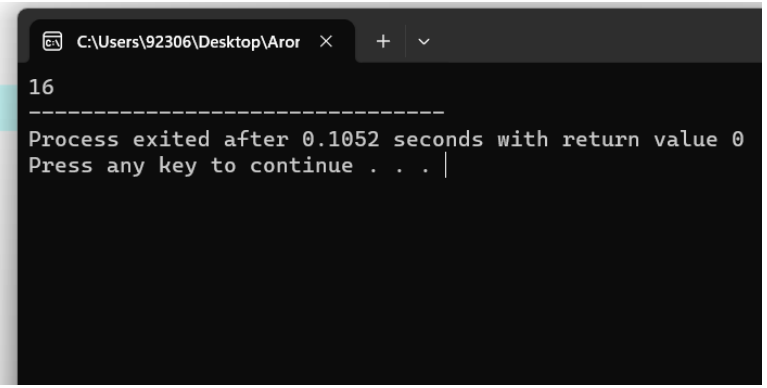
string

- String library allows us to work with C++ style strings

C++ string functions 1. size() function

- size() function is used to find the length (number of characters) of a string
- Available in string header file

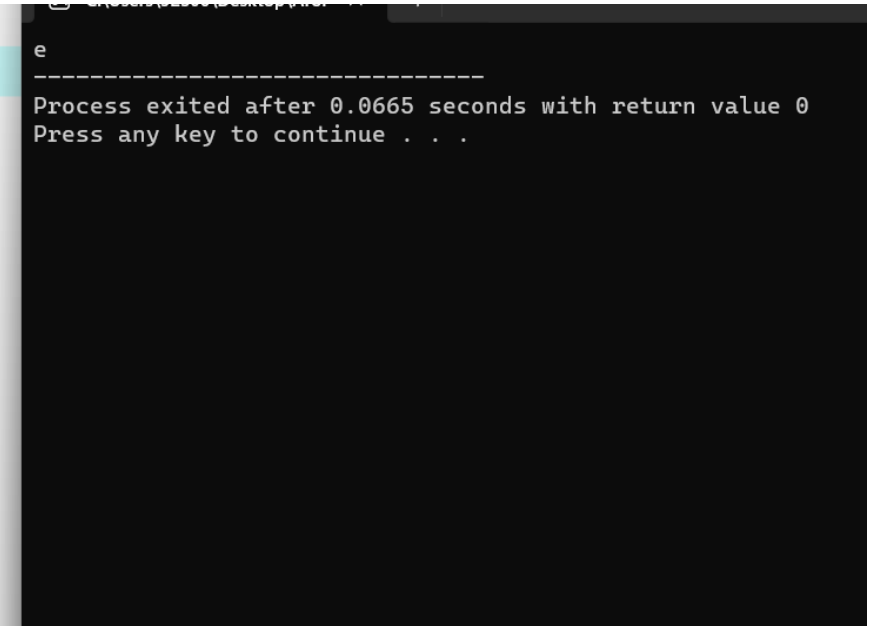
```
string my_str("");
my_str="Monday is boring";
int length=my_str.size();
cout<<length;
```



2. at() function

- It gives the index of a character in the string variable

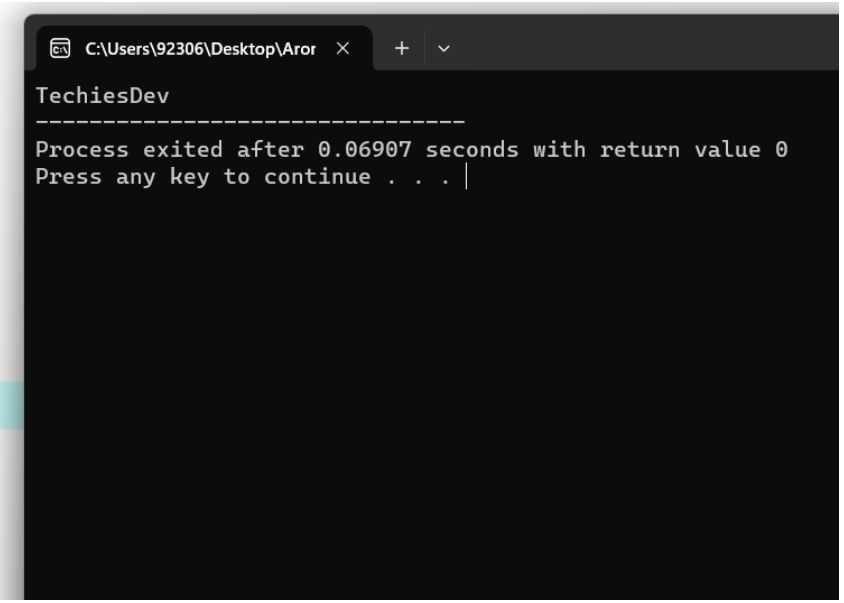
```
#include<iostream>
#include<string>
using namespace std;

int main(){

string s1("TechDev");
cout<<s1.at(5);

return 0;
}
```



3. insert() function

- Inserts a string value at particular position in a string variable

```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){

string s1("TechDev");
s1.insert(4,"ies");
cout<<s1;

return 0;
}
```



4. replace()

- It replaces a substring of a given string, with another string

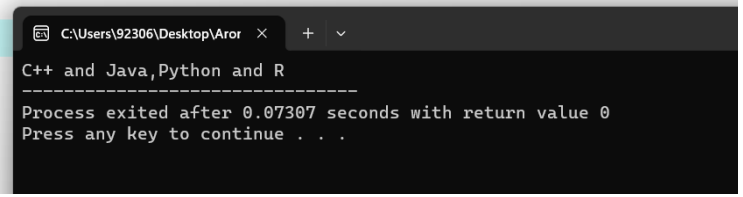
```cpp
#include<string>
using namespace std;

int main(){
    string string1 = "C++ and Java";
    string string2 = "Python";
    //first number is position
    //second number is the length of replacing string
    string1.replace(8, 6, string2);
    cout<<string1;
return 0;
}
```

```
C:\Users\92306\Desktop\Aror
C++ and Python
--------------------------------
Process exited after 0.07617 seconds with return value 0
Press any key to continue . . .
```

5. append()

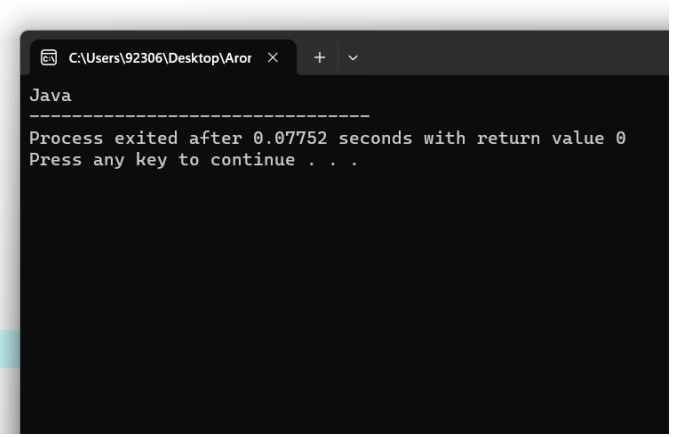
- It appends a string at the end of a given string

```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    string string1 = "C++ and Java,";
    string string2 = "Python and R";
    string1.append(string2);
    cout<<string1;
return 0;
}
```



6. copy()

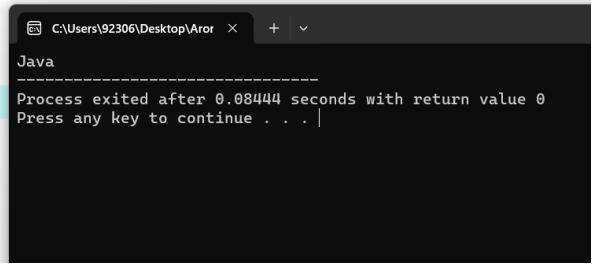
```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    string string1 = "C++ and Java,";
    char string2[5];
    //string 1 is source
    string1.copy(string2,4,8);
    cout<<string2;
return 0;
}
```



7. substr()

- Extracts a substring from the given string, we specify the position from where the extraction will start, and length of the substring to be extracted.

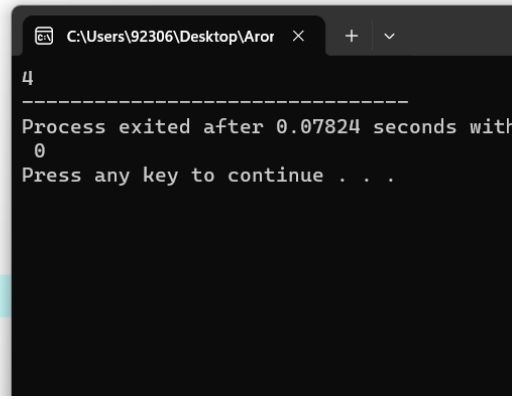
```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    string string1 = "C++ and Java,";
    //start from position 8 and length 4
    string string2=string1.substr(8,4);
    cout<<string2;
return 0;
}
```



8. find()

- Finds the first occurrence of a given character in the string

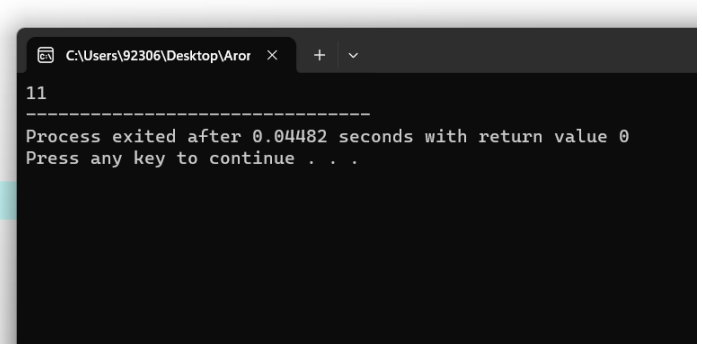
```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    string string1 = "C++ and Java,";
    cout<<string1.find('a');
return 0;
}
```



9. rfind()

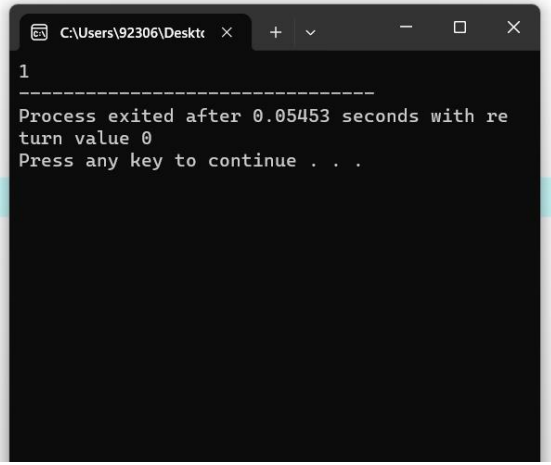
- Finds the last occurrence of a given character in the string

```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    string string1 = "C++ and Java,";
    cout<<string1.rfind('a');
return 0;
}
```



10. compare()

```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    //Returns 1 because string1 is greater
    string string1 = "C++ and Java,";
    string string2= "B-- & Java";
    cout<<string1.compare(string2);
return 0;
}
```



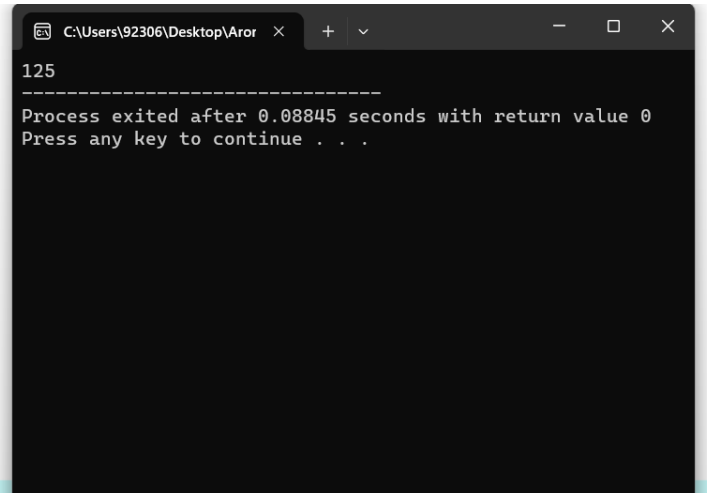
10. compare(), for comparing two substrings

```
#include<iostream>
#include<string>
using namespace std;

int main(){
    //Returns 0 because both substrings are equal
    string string1 = "C++ and Java";
    string string2= "B-- & Java";
    //start from 8 in string1 and take 4 characters onward
    //start from 6 in string2 and take 4 characters onward
    cout<<string1.compare(8,4,string2,6,4);
return 0;
}
```

11. stoi

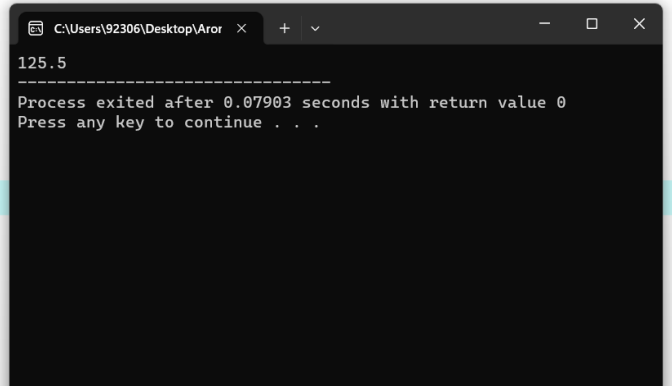
- Converts string to Integer, it only accepts a numeric string.

```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    string s1="123";
    int converted=stoi(s1);
    cout<<converted+2;
return 0;
}
```



12. stof, stod, conert string to float, and double respectively

```cpp
#include<iostream>
#include<string>
using namespace std;

int main(){
    string s1="123.5";
    float converted=stof(s1);
    cout<<converted+2;
return 0;
}
```



13. to_string()

- Converts various types in their string representation.

```
int num = 42;
double pi = 3.14159;

string numAsString = std::to_string(num);
string piAsString = std::to_string(pi);

cout << "Integer as string: " << numAsString << std::endl;
cout << "Double as string: " << piAsString << std::endl;
```

Activity

- Define a function named array_sizes, which takes a string array as its parameter, and prints the length of each array element on the console.