← 3.13 String comparisons

Students:
Section 3.14 is a part of 2 assignments: CSC108 CH03.1-3.20 C2B

Includes: CA
Due: 03/29/2025, 11:59 PM EST

This assignment's due date has passed. Activity will not be recorded, but will not count towards this assignment (unless the due date is changed). See due activity for more info.

3.14 String access operations

String character indices

A string is a sequence of characters in memory. Each string character has a position number called an **index**, starting with 0 (not 1).

AUTOGRADED ACTIVITY 3.14.1: A strings's characters each has an index, starting with 0.

Start (Is speed)

Captions ^

1. A string is a sequence of characters. So "Mary" is a sequence of characters M, a, r, y.
2. Each character has an index, starting with 0 (not 1). For a five-character string like "Mary", M is at index 0, a at 1, r at 2, and y at 3.
3. A character string's last index is 5, not 4.

Feedback?

AUTOGRADED ACTIVITY 3.14.2: String indices.

1) For string 'Light', what is L's index?
- 0
- 1

2) For string 'Light', what is i's index?
- 0
- 1
- 2

3) For string 'Light', what is t's index?
- 0
- 1
- 2

4) For string "Oh my", which character is at index 2?
- m
- (space)
- o

5) For string "You watch", which character is at index 4?
- (space)
- w

6) For string "You watch", which character is at index 5?
- h
- a
- (no such character

Feedback?

Accessing string characters

a[i] The notation someString.at(x) accesses the character at index x of a string.

Figure 3.14.1: String character access: Word scramble.

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

int main()
{
   string wordWord;

   cout << "Enter a 5-letter word: ";
   cin >> wordWord;

   cout << "Thisisthisisat: ";
   cout << wordWord.at(0);
   cout << wordWord.at(1);
   cout << wordWord.at(2);
   cout << wordWord.at(3);
   cout << wordWord.at(4);
   cout << endl;

   return 0;
}
```

```
Enter a 5-letter word: water
Thisisthisisat: ewrtat

Enter a 5-letter word: quick
Thisisthisisat: ckuqi

Enter a 5-letter word: 32745
Thisisthisisat: 47327
```

Feedback?

AUTOGRADED ACTIVITY 3.14.3: Accessing string characters.

Given userString is assigned with "Hurt", what does each statement return?

1) `userString.at(0);`
- H
- u

2) `userString.at(3);`
- r
- t

3) `userString.at(4);`
- (blank)
- (error)

Feedback?

Changing a character in a string

A character in a string can be assigned. If userString is "abcde", then `userString.at(3) = 'X';` changes userString to "abcXe".

Figure 3.14.2: Example: Changing a character.

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

int main()
{
   string userWord = "Thatsapizza";
   int myLocation;

   cout << "Thatsa, an alpha-strings: ";
   cin >> myLocation;

   userWord.at(myLocation) = 'Z';

   cout << "Thatsa, an alpha-strings: ";
   cout << userWord << endl;

   return 0;
}
```

```
Enter an index (0-11): 3
Thatsa, an alpha-strings: Thatsapizza

Enter an index (0-11): 3
Thatsa, an alpha-strings: ThatsaZpizza

Enter an index (0-11): 10
Thatsa, an alpha-strings: ThatsaZpizZa
```

Feedback?

AUTOGRADED ACTIVITY 3.14.4: Assigning a string character.

Given firstname is assigned with "Ron", what is firstname after each statement?

1) `firstname.at(1) = 'A';`
- Ron
- RAn

2) `firstname.at(3) = 'r';`
- Ryel
- error

3) `firstname.at(0) = "Ab";`
- Abn
- The statement does not compile.

Feedback?

Working with the end of a string

Determining the last character in a string is often useful. If a string's length is known, the last character is at index length - 1. Ex: "Hey" has length 3, with a at index 2. The function `size()` returns a's length. Ex: If s is "Hey", s1.size() returns 3.

A common task is to append (add) to the end, a string to an existing string.

- **push_back()** adds a character to the end of a string. Ex: If s is "Why", s1.push_back('?'); changes s1 to "Why?".
- **append()** adds one string to the end of another. Ex: If s1 is "Hey", s1.append("!!"); changes s1 to "Hey!!".
- The **+** operator can return a new string with one string appended to another string. Ex: If s1 is "Hey", then s2 = s1 + "!!"; assigns s2 with "Hey!!".

The example program below might be part of a "caption contest" for a website where a user enters a strong below an image. The program automatically adds a period if the user doesn't include any punctuation at the capt(ion) end.

Figure 3.14.3: Example: Adding a period to a caption if no punctuation.

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

int main()
{
   string userCaption;
   char lastChar;

   cout << "Enter a caption: ";
   getline(cin, userCaption);

   lastChar = userCaption.size();
   lastChar = userCaption.at(lastChar);

   if (lastChar != '.' && lastChar != '?' && lastChar != '!')
      // Assume caption lacked ending punctuation, so add a period
      userCaption.push_back('.');

   cout << "Thus, ";
   cout << userCaption << endl;

   return 0;
}
```

```
Enter a caption: Hello world
Thus, Hello world.

Enter a caption: Anyone home?
Thus, Anyone home?

Enter a caption: Yuck!
Thus, Yuck!

Enter a caption: Another day, hour, minute, day.
Thus, Another day, hour, minute, day.

Enter a caption: Life is sweet when life is sweet.
Thus, Life is sweet.
```

Feedback?

size() and length()

The size() and length() functions both return a string's length. Ex: For the string firstname = "Tom", firstname.size() and firstname.length() both return 4.

AUTOGRADED ACTIVITY 3.14.5: Working with the end of a string.

1) What is the index of the last letter in "Hey"?
- 2
- 3
- 4

2) What is the length of string "Hey"?
- 2
- 3
- 4

3) Is a string's length the same as a string's last index?
- Yes
- No, the length is 1 greater
- No, the length is 1 less

Feedback?

AUTOGRADED ACTIVITY 3.14.6: String length.

Given userText is assigned with "Intern 11_2024".

1) What does `userText.size()` return?

Check Show answer

2) What is the index of the last character in userText?

Check Show answer

3) What character does `userText.at(userText.size() - 1);` return?

Check Show answer

Feedback?

AUTOGRADED ACTIVITY 3.14.7: Working with the end of a string.

For each question userString is initially "Done". Indicate userString's value after the statement provided.
Do not type quotes in your answer, so type Done rather than "Done". If appropriate, type: Error

1) `userString.append("?");`

Check Show answer

2) `userString.append("!");`

Check Show answer

3) `userString.push_back('?');`

Check Show answer

4) `userString.append(" now");`

Check Show answer

5) `anotherString = "yet...";`
`userString = userString + anotherString;`

Check Show answer

6) `userString.at(sizeOfString.size() - 1) = '?';`

Check Show answer

7) `userString.at(sizeOfString.size() - 1) = '?';`

Check Show answer

Feedback?

Common errors

A common error is to access an invalid string index, especially exactly one larger than the largest index. Given userText with size 9, the range of valid indices are 0 .. 7, accessing with index 8 is an error.

AUTOGRADED ACTIVITY 3.14.8: Common error: Out-of-range access yields an exception.

Start (Is speed)

myNum = 5;
myNum = myNum + 1;
myNum = myNum + 1;
myNum = myNum + 1