به نام خدا

برنامه سازی کامپیوتر

Assignment 3

دانشکده

مهندسی مکانیک

زمان تحویل:

1401/02/18

استاد درس:

دکتر مهکامه شربتدار

- کدها را فقط به فرمت ".cpp" قرار داده و از فرستادن کل پروژه یا فایل‌های اضافی خودداری کنید.
- تمامی فایل‌ها را در یک فایل ".zip" و یا ".rar" ذخیره کرده و به شکل "AS3_ID_LastName" در سایت بارگذاری کنید.

برای مثال برای فردی با نام خانوادگی کریمی و شماره دانشجویی 9912345 نام فایل "AS3_9912345_Karimi" خواهد بود.

---

1. Write a program that allows two players to play a game of tic-tac-toe. Use a two-dimensional char array with three rows and three columns as the game board. Each element of the array should be initialized with an asterisk (*). The program should run a loop that
   - Displays the contents of the board array
   - Allows player 1 to select a location on the board for an X. The program should ask the user to enter the row and column number.
   - Allows player 2 to select a location on the board for an O. The program should ask the user to enter the row and column number.
   - Determines whether a player has won, or a tie has occurred. If a player has won, the program should declare that player the winner and end. If a tie has occurred, the program should say so and end.

   Player 1 wins when there are three Xs in a row on the game board. The Xs can appear in a row, in a column, or diagonally across the board. A tie occurs when all of the locations on the board are full, but there is no winner.

---

2. Write a program that simulates a lottery. The program should have an array of five integers named lottery and should generate a random number in the range of 0 through 9 for each element in the array. The user should enter five digits, which should be stored in an integer array named user. The program is to compare the corresponding elements in the two arrays and keep a count of the digits that match. For example, the following shows the lottery array and the user array with sample numbers stored in each. There are two matching digits (elements 2 and 4).

   lottery array:

7	4	9	1	3

   user array:

4	2	9	7	3

   The program should display the random numbers stored in the lottery array and the number of matching digits. If all of the digits match, display a message proclaiming the user as a grand prize winner.

---

3. Write a program with four predefined string objects, each containing a sentence from the following text:

   "James Watt designed his first governor in 1788 following a suggestion from his business partner Matthew Boulton. It was a conical pendulum governor and one of the final series of innovations Watt had employed for steam engines. James Watt never claimed the centrifugal governor to be an invention of his own. A giant statue of Watt's governor stands at Smethwick in the English West Midlands."

   Concatenate these string objects into one string object named "text" and display it in console output. Afterward, write an algorithm that counts the number of words in this text and displays it in the output.

---

4. Write a program that has an array of at least 10 string objects that hold people's names and phone numbers. Use the following string objects as inputs.

"Alejandra Cruz, 555-1223"
"Joe Looney, 555-0097"
"Geri Palmer, 555-8787"
"Li Chen, 555-1212"
"Holly Gaddis, 555-8878"
"Sam Wiggins, 555-0998"
"Bob Kain, 555-8712"
"Tim Haynes, 555-7676"
"Warren Gaddis, 555-9037"
"Jean James, 555-4939"
"Ron Palmer, 555-2783"

The program should ask the user to enter a name or partial name to search for in the array. Any entries in the array that match the string entered should be displayed. For example, if the user enters "Palmer", the program should display the following names from the list:

Geri Palmer, 555-8787
Ron Palmer, 555-2783

---

5. Write a program that lets the user enter the total rainfall for each of 12 months into an array of doubles. The program should calculate and display the total rainfall for the year, the average monthly rainfall, and the months with the highest and lowest amounts.

Input Validation: Do not accept negative numbers for monthly rainfall figures.

---

6. Write a function named countChars(char *strPtr, char ch) that counts the number of times a specific character appears in a string. Call and test the function in the main function.

Descriptions:
- Definition of countChars(): The parameter strPtr is a pointer that points to a string. The parameter Ch is a character that the function searches for in the string. The function returns the number of times the character appears in the string.
- You should get the string and the character from the user in the main function.

تمرین امتیازی:

Write a program that uses two identical arrays of at least 20 integers. It should call a function that uses the bubble sort algorithm to sort one of the arrays in ascending order. The function should keep a count of the number of exchanges it makes. The program then should call a function that uses the selection sort algorithm to sort the other array. It should also keep count of the number of exchanges it makes. Display these values on the screen.