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Handout 3
C++ Programming
Deadline is
October 16

1a. Write a function **`count_chars`** that has the function head

`void count_chars(char text[])`

and that performs the following task:

`count_chars` prints a table listing the number of occurrences of the individual characters A to Z (capitalized as well as non-capitalized) in the argument **`text`**. The argument **`text`** is assumed to be a C-string that is terminated using a NULL-character.

```
#include <iostream>

void count_chars_with_letter(char text[], char letterToSearchFor) {
    int counter = 0;
    for (char *letter = &text[0]; *letter; letter = letter + 1) {
        if (tolower(*letter) == letterToSearchFor)
            counter++;
    }
    std::cout << (char) toupper(letterToSearchFor)
         << ", " << letterToSearchFor << " : " << counter << std::endl;
}

void count_chars(char text[]) {
    for (int htmlCode = 97; htmlCode <= 122; htmlCode++)
        count_chars_with_letter(text, (char) htmlCode);
}

void count_chars_other_solution(char text[]) {
    int counters[26] = {};
    for (char *letter = &text[0]; *letter; letter = letter + 1) {
        int htmlCode = (int)toLower(*letter);
        if (htmlCode >= 97 || htmlCode <= 122)
            counters[htmlCode - 97] += 1;
    }
    for (int counter = 0; counter <= 25; counter++) {
        std::cout << (char) (counter + 65) << ", "
            << (char) (counter + 97) << " : " << counters[counter]
            << std::endl;
    }
}

int main() {
    char text[] = "Today is a nice day for having a little picnic.";
    count_chars(text); // does not need a counters-array
    //count_chars_other_solution(text); //has no nested for-loop
    return 0;
}
```

1b. Modify/extend the function **`count_chars`** so that it additionally prints a bar diagram showing the occurrences of the characters A to Z. The height of each bar shall be equal to the number of occurrences of the corresponding character in the argument **`text`**. For the above example, your output should look like:

```
          *
*         *
*         *
* *       *     *       *
* ***     *   * **     *     *
* ******** * *** *** *   *
ABCDEFGHIJKLMNOPQRSTUVWXYZ
```

```
void count_chars(char text[]) {
    int counters[26] = {0};
    // count all the letters
    for (char *letter = &text[0]; *letter; letter = letter + 1) {
        int htmlCode = (int)toLower(*letter);
        if (htmlCode >= 97 || htmlCode <= 122)
            counters[htmlCode - 97] += 1;
    }

    // find the max
    int max = 0;
    for (int counter : counters){
        if (counter > max) max = counter;
    }

    // print the bar graph
    for (int currentY = max; currentY >= 0; currentY--) {
         for (int counter = 0; counter <= 25; counter++) {
             if (currentY == 0){
                 std::cout << (char) (counter + 65);
             }
             else if (counters[counter] >= currentY)
                 std::cout << "*";
             else
                 std::cout << " ";
         }
         std::cout << "\n";
     }
}

int main() {
    char text[] = "Today is a nice day for having a little picnic.";
    count_chars(text);
    return 0;
}
```