ACRELEC

Technical Skills Evaluation - v1.3 (2019)

Name: _____Date: ____/_____/_____

Considerations

- You have **120 minutes** to complete this test;
- It is not allowed to utilize mobile devices during the test. Please, turn off your mobile device at this moment;
- Write down your assumptions whenever necessary for our better understanding;
- Write the APIs in any of the following languages: C#, Java or C/C++;

Cover letter

Write an introduction letter (cover letter) in English describing why we should hire you. Finalize the letter with your greatest strengths and weakness. Keep it simple and objective.

Data Structure

1. Describe the differences (if any) between stack and queue;
2. In which situation should be used a List over an Array structure?
3. Explain the meaning of collision in a hash table data structure;

Algorithms

4. Write an API, which receives an integer N and returns a Boolean Z; the API shall determine if the given integer N is odd or even.

   Considerations:

   a) it is **ONLY** allowed to use addition or subtraction operations;
   b) zero shall be considered as even;
   c) N is an integer, which can be negative or positive;

5. Write an API, which receives a string S and returns a Boolean Z; the API shall determine if the content of the given string S is **properly nested**.

   Considerations:

   a) it is NOT allowed to use regular expression;
   b) string S consists only of the following characters: "(", "{", "[", "]", "}" and/or ")";
   c) S has the form "(U)" or "[U]" or "{U}", where U is a properly nested string; For example, given S = "**{[()()]}**", the API should return true and for given S = "**([)()]**", the API should return false;
   d) empty string shall be considered as properly nested;

6. Write an API, which receives an integer N and returns an integer Y; the API shall calculate the maximal sequence of consecutive zeros that is surrounded by ones at both ends in the binary representation of N.

   Considerations:

   a) if N is 9 (1**00**1), it should return 2;
   b) if N is 328 (101**00**1000), it should return 2;
   c) if N is 20 (1**0**100), it should return 1;
   d) if N is 30 (11110), it should return 0;

7. Write an API, which receives two integers X and Y and returns Z; the API shall return the bitwise AND product (Z) for all the numbers of the given range (X and Y).

   Considerations:

   a) X and Y are positive integers and X<=Y;
   b) for example, the bitwise AND **product** when X=5 and Y=7 is 4, because:
      5(101) **bitand** 6(110) **bitand** 7(111) = 4(100)

8. Write an API, which receives an array of integers A, an integer N and returns an array of integers Z; the API shall return an array Z with the rotated elements of the array A, based on the given integer (rotation) N;

   Considerations:

   a) N is an integer, which can be negative or positive;
   b) if N is positive, then the elements should be rotated to the right position;
   c) if N is negative, then the elements should be rotated to the left position;
   d) for example, given array A = [3, 8, 9, 7, 6] and N = -1, the API should return [8, 9, 7, 6, 3];