

General Programming

1. The Fibonacci sequence is defined as a sequence of integers starting with 1 and 1, where each subsequent value is the sum of the preceding two. I.e.

$$f(0) = 1$$

$$f(1) = 1$$

$$f(n) = f(n-1) + f(n-2) \text{ where } n \geq 2$$

Write a program in a language of your choice to calculate the sum of the first 100 even-valued Fibonacci numbers

2. Describe 3 different data structures that could be used to implement an associative array where both the keys and values are strings, and comment on their relative advantages and disadvantages
3. Write a function in a language of your choice that merges two sorted lists into a new sorted list. E.g. [1,4,6],[2,3,5] \rightarrow [1,2,3,4,5,6].
4. Write a function in a language of your choice which is passed two unsigned integers, a value and a base. It should print the supplied value in the supplied base. The base is in the range 2 to 36, and digit values greater than 9 are represented in the output by the alphabetic characters such that 10 is 'A' etc.