ACM40660/PH502 Assignment 2

ICHEC

Deadline: 5th December 2023 at 5:30pm

1. You are going to implement a linked list with a single integer as its data. The list will be manipulated with several functions but will operate as a **queue**. These functions will often take pointers as arguments, and some of them will return pointers as a return value. A visual reference is provided further down for an illustration of how some of these functions affect a list.

   Use the file `fifo_stub.c` or `.f90` as the starting point for your code. The cells of the list have already been created `struct cell` and the functions needed have been partially done. Complete the code so that you achieve the correct operation shown in the diagram below. Test your functions from your `main()` by allocating cells and printing out their content.

   (a) Write the `newcell(int n)` function that allocates a new cell in memory and fills its content with a value passed as an argument. As by default this cell doesn't point anywhere, affect its 'next cell' pointer to `NULL`.

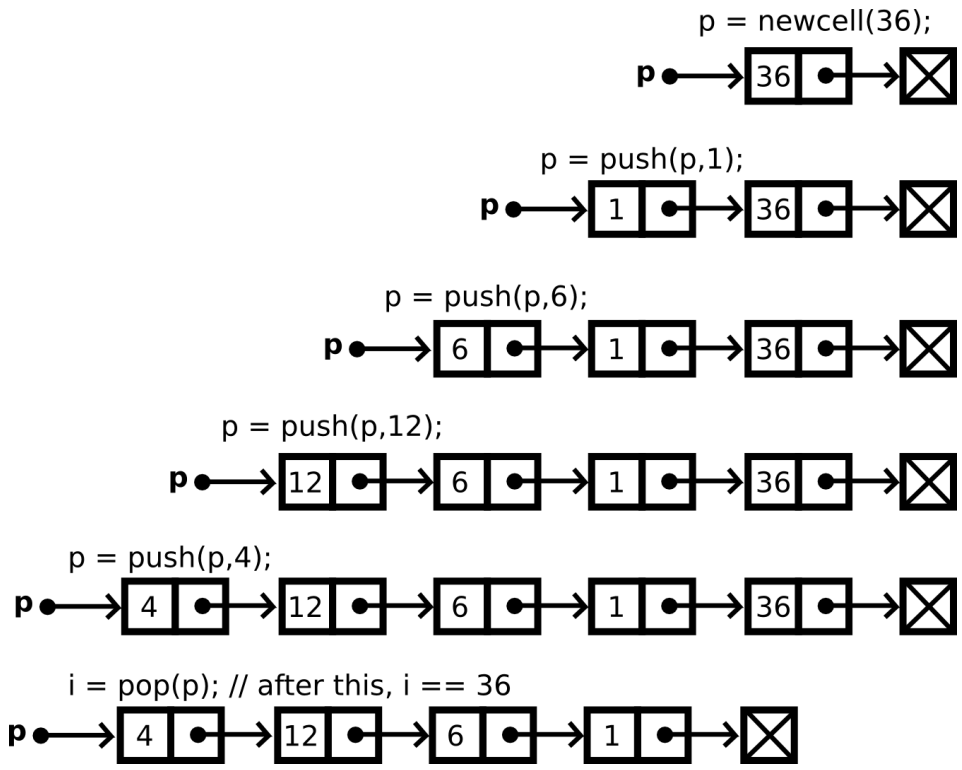
   (b) Write the `push()` function that takes a pointer to a cell and an integer as arguments. It should insert a new cell at the front of the list with the integer for content, and return a pointer to it. The last cell in your list should always point to `NULL` as its 'next cell'.

   (c) Write the `countcells()` function that returns the number of cells in a list passed as an argument.

   (d) Write the `printlist()` function that prints the content of the cells of a list passed as an argument in the order in which they're stored.

   (e) Write the `pop()` function that removes and deallocates the last cell of a list passed as an argument and return its former content.

   (f) Write the `deallocatelist()` function that deallocates all linked cells of a list passed as an argument and returns the number of cells freed.



Some general points:

(a) the main point is to get the program to do what the question asks (use either FORTRAN or C),

(b) make sure your code is syntactically correct and standard (i.e. it compiles on sciprog),

(c) comment your code and place any observations as comments,

(d) you can use -Wall as a compile option,

(e) make sure the work is your own and upload the completed code to BrightSpace/Canvas.