PY 421 - Introduction to Computational Physics

Homework # 7. March 31, 2013.

Due at discussion time (3PM) on Friday April 5.

The assignment:

For this assignment you will have to complete a program which manipulates a linked list of integers. You should copy the file `asgn7_s13.f90` from the ∼rebbi/courseware/code/ directory on the CAS cluster to your working directory. The file contains a Fortran program which you should complete. The program compiles and executes, but does not do what the completed program should do. The program I am giving you defines a `TYPE item` which has three components: the item's entry, which is an integer, and the pointers to the next and previous items in the linked list. The program then initializes the list with three items, with the integers 27, 8, and 14. The completed program should allow the user to move forward and backward in the list, to insert a new item immediately after the current item, to remove the current item making the previous item the new current item, and to swap the current item with the one that follows. The program in `asgn7_s13.f90` already takes care of a few situations where the programming gets tricky, for example when one eliminates the last item in the list. For the rest it is your job. (But please see the hints below.)

Returning the assignment:

Once you have completed your program, you should copy it using one of the CAS 327 workstations onto the file

∼rebbi/courseware/asgn/asgn7.xxyyyy.

Hints:

1) Start with the simplest tasks, like moving to the next item or the previous item. These are one line instructions. Compile and check that the instructions do the job.

2) The program `asgn7_s13.f90` defines two pointer variables `current` and `auxp`. I found that these are sufficient to implement the program's functionality, but you should feel free to define more pointer variables if you think you need them.

3) Compile often as you progress with your work to catch any error right away.

4) The program `asgn7_s13.f90` already takes care of the tricky situations, like when the user wishes to insert an item in an empty list or wishes to remove the last item in the list. These steps use the intrinsic function `ASSOCIATED`. You will not need to use it, but google it to see what it does.

5) The amount of work needed to complete the assignment is not much, but working with linked list can get very frustrating. If you run into difficulty, do not get frustrated! Rather ask for help.

Grading:

A program which compiles and executes correctly will be given a score of 100, with points deducted for mistakes and poor program presentation, according to the severity of the error.