Data Structures and Program Design Using C

SCS 1301

AY 21 - Semester 1

Exercise VI

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1. Extend the program in Exercise IV - 3 (e) to use function pointers to invoke the relevant functions when the user chooses from the menu.

2. Consider an integer array of 200 elements viewed as a memory. Each cell in the array is to be considered a memory block.

   - The function *NewMalloc(int dataType)* is used to assign memory blocks on demand and returns a void pointer to the first cell of the memory blocks assigned.
   - The user requests memory dynamically by specifying variables equivalent to primitive data types in C. The relevant size of the primitive type has to be passed as an integer to the *NewMalloc(...)* method that would assign the relevant number of contiguous blocks from the array memory mentioned above.
   - When the user wants to delete the memory allocated to a particular variable, the relevant void pointer is passed as a parameter to the function *NewFree(void *ptr)* which would free the blocks held by the variable and make it available for writing.
   - Memory is considered full if and only if all 200 blocks are assigned to some variable.

   (a) Write a C program to simulate the memory allocation behaviour as specified above.

   (b) Write a function to defragment the memory by repacking the memory allocations in such a way that all allocated blocks are contiguous

   (c) Extend the above program to support an array with any primitive type.

3. Create a user-defined type to contain a 2D point and write C programs for the following:

   (a) Write a function that takes two points and provides the distance between the points. **It is important to do your individual research on the distance measurements specified below.**

      i. Euclidean Distance
      ii. Mantan Distance
      iii. Chebychev Distance

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