Indian Institute of Information Technology Allahabad

Assignment - Arrays & Link List (Oct 2021)

M.Tech

Course Name	Course Code	Deadline
Programming Practices	—-	Oct. 11, 2021, 11:59 P.M. IST

***Important Instructions**: This is an individual assignment i.e., not to be done in a team/group. You have to submit a zip file of the programs. Submit the assignment files on Google classroom page Late submissions will not be entertained. These are very basic problems and it is easy to find the solution to this assignment on the Internet as well. However, during evaluation we may ask you to explain the code and also solve any related problem on the spot. Hence, practising these solutions yourself is the best option. So please use your ethics and do the assignment to improve your learning.*

In the theory class, we discussed arrays and link list and there implementations. In this assignment we will use these two data structures to solve some problems.

1. Implement basic functions for creation, insertion, deletion, traversing, searching etc. in a header circular link list with dynamic memory allocation. Please make sure that every operation is implemented as a separate function. Distribute your code in three files: main.c (call every utility function), list.h (write all declarations), list.c (define all the functions).

2. Repeat the previous problem with contiguous memory allocation for the list as discussed in the class. Now, you should also maintain the free node list as well. Assume that the maximum number of elements in the list are 1024. Compare the memory utilization of both the lists. Also, compare the runtime per operation of dynamic memory allocation and contiguous representations. Should there be any difference in the runtime? Comment.

3. Write a program using 2-dimensional arrays to implement common matrix operations like matrix multiplication, determinant, inverse of a matrix, displaying a matrix etc. For every operation write a separate function and pass array to functions with the help of a pointer only. All the array accesses need to be made using pointer dereferencing only (for example *(*(p+i)+j)).

4. Read this article on Creating static and Dynamic libraries to create your own libraries and link with these files to create an executable.