National Institute of Technology, Calicut
Department of Computer Science and Engineering
Monsoon2021
CS2092D – PROGRAMMING LABORATORY (MCA-I A)
Assignment-5

Policies for Submission and Evaluation

You must submit your assignment in the moodle (Eduserver) course page, on or before the submission deadline. Also, ensure that your programs in the assignment must compile and execute without errors in Athena server. During evaluation your uploaded programs will be checked in Athena server only. Failure to execute programs in the assignment without compilation errors may lead to zero marks for that program.

Your submission will also be tested for plagiarism, by automated tools. In case your code fails to pass the test, you will be straightaway awarded zero marks for this assignment and considered by the examiner for awarding F grade in the course. Detection of ANY malpractice regarding the lab course will also lead to awarding an F grade.

Naming Conventions for Submission

Submit a single ZIP (.zip) file (do not submit in any other archived formats like .rar or .tar.gz). The name of this file must be ASSG<NUMBER>_<ROLLNO>_<FIRSTNAME>.zip. (For example: ASSG4_BxxyyyyCS_LAXMAN.zip). DO NOT add any other files (like temporary files, inputfiles, etc.) except your source code, into the zip archive. The source codes must be named as
ASSG<NUMBER>_<ROLLNO>_<FIRSTNAME>_<PROGRAM-NUMBER>.<extension>
(For example: ASSG4_BxxyyyyCS_LAXMAN_1.c). If there are multiple parts for a particular question, then name the source files for each part separately as in
ASSG4_BxxyyyyCS_LAXMAN_1b.c.
If you do not conform to the above naming conventions, your submission might not be recognized by some automated tools, and hence will lead to a score of 0 for the submission. So, make sure that you follow the naming conventions.

Standard of Conduct

Violations of academic integrity will be severely penalized. Each student is expected to adhere to high standards of ethical conduct, especially those related to cheating and plagiarism. Any submitted work MUST BE an individual effort. Any academic dishonesty will result in zero marks in the corresponding exam or evaluation and will be reported to the department council for

record keeping and for permission to assign an F grade in the course. The department policy on academic integrity can be found at:

http://minerva.nitc.ac.in/cse/sites/default/files/attachments/news/Academic-Integrity_new.pdf .

Assignment_6
Questions

1. **Question:-1**:

   Write a C program to calculate, plot and analyze the execution time of insertion sort. We need to check the execution time for various input sizes and for a given input array. We will consider three type of input array. For example,

   A random array:

   [95, 24, 63, 10, 2, 4, 69, 85, 47]

   A sorted array:

   [2, 4, 10, 24, 47, 63, 69, 85, 95]

   A reverse sorted array:

   [95, 85, 69, 63, 47, 24, 10, 4, 2]

   We are using the same values in each array to keep the comparison fair.

   Our aim is to plot and analyze the graph between the execution time of insertion sort verses size of array for a given input type.

   The range of n varies from 10 to 100000.

   We can use the rand( ) in C to assign values to each array.

   To plot a graph on x-y coordinate you can use the Gnuplot in C.

   Output:

   output for random array:

A_size(n)	Time(ms)
100	19
1100	11
2100	21
3100	126
4100	478
5100	904
6100	1047
7100	1590
8100	1754
9100	1998

   output for sorted array:

A_size(n)	Time (ms)
100	2

1100	10
2100	19
3100	21
4100	34
5100	45
6100	37
7100	61
8100	49
9100	78

output for reverse sorted array:

A_size(n)	Time (ms)
100	2
1100	10
2100	17
3100	19
4100	35
5100	45
6100	36
7100	42
8100	48
9100	74

Plot the graph for given values and analyze the nature of graph.

Question:-2:

Write a C program to calculate execution time of quick sort and also plot a performance graph in terms of time and input size. For performance analyses you need to use the same array like:

for random array use [95,24,63,10,2,4,69,85,47] ,

for sorted array use [2,4,10,24,47,63,69,85,95] ,

for reverse sorted array use [95,85,69,63,47,24,10,4,2]

Output:

Output of Random Array:

A_size(n)	Time(ms)
100	15
1100	2914
2100	1708
3100	2287
4100	6343
5100	11400
6100	23268
7100	34708
8100	53394
9100	75279

output for Sorted Array:

A_size(n)	Time
100	15
1100	2413
2100	3800
3100	2826
4100	5500
5100	17743
6100	31840
7100	68138
8100	79122
9100	92216

output for Reverse Sorted Array:

A_size(n)	Time
100	52
1100	2523
2100	7570
3100	20431
4100	5649
5100	51364
6100	67820
7100	86257
8100	114700
9100	146699

Plot the graph for given values and analyze the nature of graph.

Question

Write a program to print the first fibonacci number in the fibonacci series .please make sure that no extra space will be taken and do it with the help of recursion only .

Output

input	time(ms)
n=42	2479566
n=40	1003190
n=35	93300
n=38	374648
n=30	7561
n=25	735.

Plot the graph for given values and analyze the nature of graph.

Question 4:

Write a C program to multiply two matrix. Note: matrices are square matrix and size of both matrices are same and both matrix initialize with some random value.

Input	Time (ms)
n=120	9894
n=100	6939
n=70	1315
n=50	529

Plot the graph for given values and analyze the nature of graph.