Design Documentation

This programming assignment consists of 3 parts,
1. CPU Benchmark
2. Memory Benchmark
3. Disk Benchmark

The basic designs of all the benchmarks are as follows:

(a) Functions are defined that does all the operations like IOPS, FLOPS, Read and write.
(b) The Main Block usually has two options. The 1st one is to input the kind of operation to be done and the second input is to know the number of threads to be executed. The functions defined are called according to this inputs.
(c) Before starting the thread the time is noted using wall clock function. The time is noted after the execution and the difference is the time of execution and this is used for further calculation.

The detailed design description of all benchmarks:

1. **CPU Benchmark:** This has 4 separate Programs. The first function is to compute the GFLOPS and this is done by doing multiple float division operations of numbers stored in an array. The second program is to calculate GIOPS and this is done by doing multiple integer multiplication operations of values stored in an array. The third program is to do integer operations for 10 minutes and produce 600 IOPS samples. A sample is generated every second. The fourth and the last program is to do floating operations for 10 minutes and produce 500 sample FLOPS samples. A sample is generated every second.
2. **Memory Benchmark:** The program consists of 6 functions to do Sequential and Random memory access using 1B,1KB and 1MB block sizes using memcpy () function. The main program is a menu driven program and user can input the kind of operation to be done. He can also select the number of threads. This two inputs are used to decide the number of threads and the function to be called.

3. **Disk Benchmark**: The program consists of 12 functions to do sequential and Random memory read and write operation using 1B,1KB and 1MB block sizes. The functions use fread (), fwrite () and fseek () to do this. The main program is a menu driven program and user can input the kind of operation to be done. He can also select the number of threads. These two inputs are used to decide number of threads and the function to be called

Improvements and Extensions to program:
The following improvements and extensions can be implemented

1. **CPU benchmark**:
i. Simple operations are used. Much more complicated operations can be used
ii. More than 4 threads can be used
iii. GUI can be implemented
iv. The functions should be done for more time and there should be graphs to show the trends of the GFLOPS and IOPS as the time progresses

2. Memory Benchmark:

i. More threads can be used.

ii. GUI can be implemented

iii. memcpy () function was used. More functions could be tried out and check which one has better output

3. Disk Benchmark:

i. More threads can be used

ii. The program was implemented in a virtual machine. So a better estimate can be obtained if used in a standalone OS

iii. Better functions than fseek (), fwrite () and fread can be used