

CPU Benchmarking:

Instruction to run code:

1. Code for CPU benchmarking is implemented in C language.
2. Name of file is "cpuBenchMarking.c".
3. Instruction to compile file :
`gcc -pthread -o result cpuBenchMarking.c`
4. Instruction to run code after successful compilation:
`./result`
5. Following screen appears after successfully executing code:

```
ubuntu@ip-172-31-28-228: ~/code/CPU
ubuntu@ip-172-31-28-228:~/code/CPU$ ./disk
Perform CPU Benchmarking on
1. 1 Thread
2. 2 Thread
3. 4 Thread : 1

Total number of operations to be performed are 1000000000.000000

Thread 0 => FLOPS: 12.218100, IOPS: 12.265588

Floating point operations per second (FLOPS) required are : 12.218100
Number of FLOPS performed per sec      : 81845786.169699
Number of Giga FLOPS performed per sec : 0.0818457862

Integer operations per second (IOPS) required are : 12.265588
Number of IOPS performed per sec      : 81528908.357268
Number of Giga IOPS performed per sec : 0.0815289084ubuntu@ip-172-31-28-228:~/code/CPU$
```

6. If user selects option 3 to run code for 4 thread as

```
ubuntu@ip-172-31-28-228: ~/code/CPU
2. 2 Thread
3. 4 Thread : 3

Total number of operations to be performed are 1000000000.000000

Thread 0 => FLOPS: 49.042309, IOPS: 49.094142
Thread 1 => FLOPS: 49.053192, IOPS: 49.092064
Thread 2 => FLOPS: 49.047174, IOPS: 49.100404
Thread 3 => FLOPS: 49.041120, IOPS: 49.103424

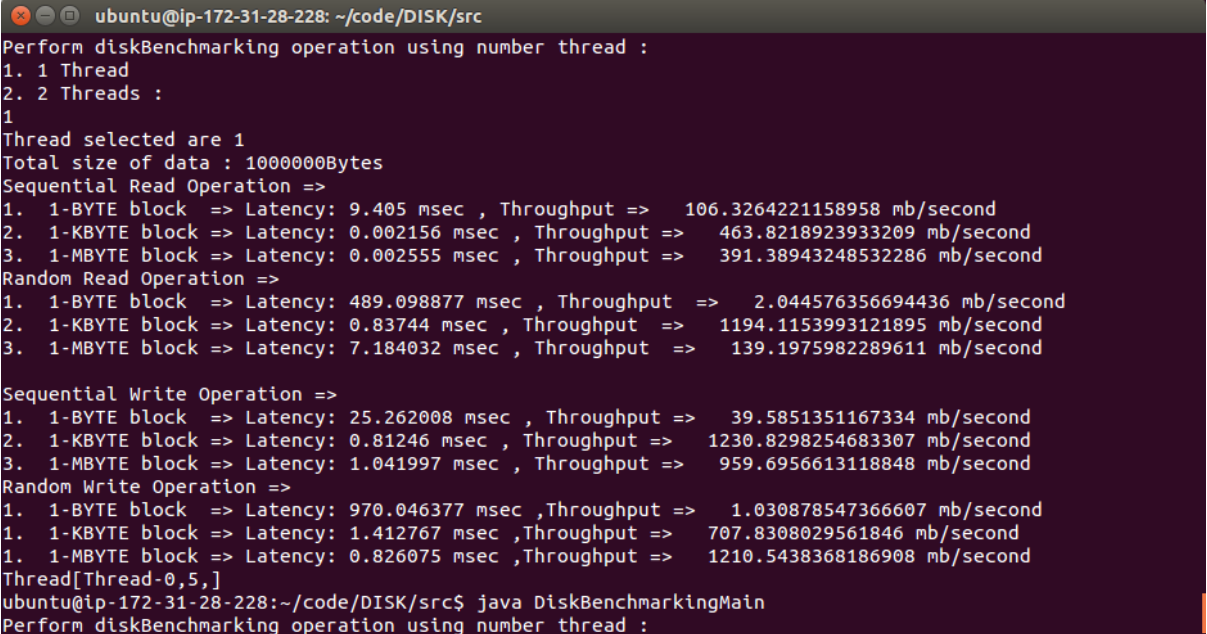
Floating point operations per second (FLOPS) required are : 49.045949
Number of FLOPS performed per sec      : 20389043.855534
Number of Giga FLOPS performed per sec : 0.0203890439

Integer operations per second (IOPS) required are : 49.097508 :
Number of IOPS performed per sec      : 20367632.300527
Number of Giga IOPS performed per sec : 0.0203676323ubuntu@ip-172-31-28-228:~/code/CPU$
```

DISK Benchmarking:

Instruction to run Disk Benchmarking:

1. Compile all following files:
 - a. DiskBenchmarkingMain.java
 - b. DiskThread.java
 - c. TimeRequired.java
2. Instruction to compile all above java files:
`javac *.java`
3. Main() method is present in DiskBenchmarkingMain.java file. So run DiskBenchmarking file to run code. Instruction to run :
`java DiskBenchmarking`
4. Following screen will appear after successfully running the code:



```
ubuntu@ip-172-31-28-228: ~/code/DISK/src
Perform diskBenchmarking operation using number thread :
1. 1 Thread
2. 2 Threads :
1
Thread selected are 1
Total size of data : 10000000Bytes
Sequential Read Operation =>
1. 1-BYTE block => Latency: 9.405 msec , Throughput => 106.3264221158958 mb/second
2. 1-KBYTE block => Latency: 0.002156 msec , Throughput => 463.8218923933209 mb/second
3. 1-MBYTE block => Latency: 0.002555 msec , Throughput => 391.38943248532286 mb/second
Random Read Operation =>
1. 1-BYTE block => Latency: 489.098877 msec , Throughput => 2.044576356694436 mb/second
2. 1-KBYTE block => Latency: 0.83744 msec , Throughput => 1194.1153993121895 mb/second
3. 1-MBYTE block => Latency: 7.184032 msec , Throughput => 139.1975982289611 mb/second
Sequential Write Operation =>
1. 1-BYTE block => Latency: 25.262008 msec , Throughput => 39.5851351167334 mb/second
2. 1-KBYTE block => Latency: 0.81246 msec , Throughput => 1230.8298254683307 mb/second
3. 1-MBYTE block => Latency: 1.041997 msec , Throughput => 959.6956613118848 mb/second
Random Write Operation =>
1. 1-BYTE block => Latency: 970.046377 msec ,Throughput => 1.030878547366607 mb/second
1. 1-KBYTE block => Latency: 1.412767 msec ,Throughput => 707.8308029561846 mb/second
1. 1-MBYTE block => Latency: 0.826075 msec ,Throughput => 1210.5438368186908 mb/second
Thread[Thread-0,5,]
ubuntu@ip-172-31-28-228:~/code/DISK/src$ java DiskBenchmarkingMain
Perform diskBenchmarking operation using number thread :
```

5. User can perform disk operation on 1 Thread or 2 Thread.
6. “config.properties” files contains field named “totalFileSizeInBytes”. This is total size of file in bytes. Write operation will create file of this size.

Network Benchmarking:

1. Compile all following files:
 - a. Main.java
 - b. TCPClient.java
 - c. TCPServer.java
 - d. UDPClient.java
 - e. UDPServer.java
 - f. TimeRequired.java
2. Instruction to compile all files :
`javac *.java`
3. Main() method is present in Main.java file.
Run this file by following instruction:
`java Main`
4. All the configuration details are present in “config.property” file.
5. Following fields present in this file :
 - a. ServerPort
 - b. ServerPortUDP
 - c. ServerIP
 - d. Datasize
 - e. Iteration
6. TCP server will start on port number mentioned for “ServerPort” field.

7. Both TCP and UDP server should start at same IP address but at different ports.
8. IP address of server should be mentioned at "ServerIP" field.
9. Size of packet to be transform over the network should be mentioned at "DataSize" field.
10. "Iteration" fields indicated that DataSize packets will transform over network for "Iteration" times.
11. So total data transfer over the network will be
$$\text{totalSize} = \text{dataSize} * \text{iteration}$$
12. After running the code successfully user will see following screen:

```
ubuntu@ip-172-31-28-228: ~/code/Network/src
1. 1 Thread
2. 2 Threads :
1
Just connected to /172.31.28.228:4411

TCP Evaluation =>
Time required sending 1024Byte over 64 iteration.
Total data send is 65536Bytes in 5.083286365E9
Throughput: 0.012892447 MB/Sec
Latency : 77,564.7943878174 msec

UDP Evaluation =>
Time required sending 1024Byte over 64 iteration.
Total data send is 65536Bytes in 2461459.0
Throughput: 26.62485948374521 MB/Sec
Latency : 37.55888366099219 msec

TCP Operation time required for communicating with data of
1. 1-BYTE packet size => Latency: 1.0445712E7 msec , Throughput => 9.573306252364606E-5 mb/second
2. 1-KBYTE packet size=> Latency: 76165.8720703125 msec , Throughput => 0.013129239813296568 mb/second
3. 64-KBYTE packet size=> Latency: 1514.70325 msec , Throughput => 0.660195322087016 mb/second

UDP Operation time required for communicating with data of
1. 1-BYTE packet size=> Latency: 1115.0 msec , Throughput => 0.8968609865470852 mb/second
2. 1-KBYTE packet size=> Latency: 0.314453125 msec , Throughput => 3180.124223602484 mb/second
3. 64-KBYTE packet size=> Latency: 0.006796875 msec , Throughput => 147126.4367816092 mb/second
TimeRequired@375ef3ab
```