CS553 Cloud Computing
Programming Assignment 1

Manual

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The assignment is done is Java and run through Amazon AWS cloud t2.micro instances. All the Operations were run on t2.micro instances and Network rum on two instances.
Here are Following Main Classes to be executed.

PA1

1. CPU

- CPU.java

Extra Experiment

- CPUFLOPS.java
- CPUIops.java

2. Disk

1.DISK SEQUENCE ACCESS

- DiskSeq.java

2. DISK RANDOM ACCESS

- DiskRandom.java

3. NETWORK

1.TCP

- PeerClient.java
- Peerserver.java

2.UDP

- Uclient.java
- UServer.java

Execution:
The program is run on Amazon AWS cloud t2.micro instances.

To execute the program in Linux systems.
First Open terminal and Connect Server(t2.micro instance),Copy files to t2.micro instance and run the command **javac Cpu.java and java Cpu.**

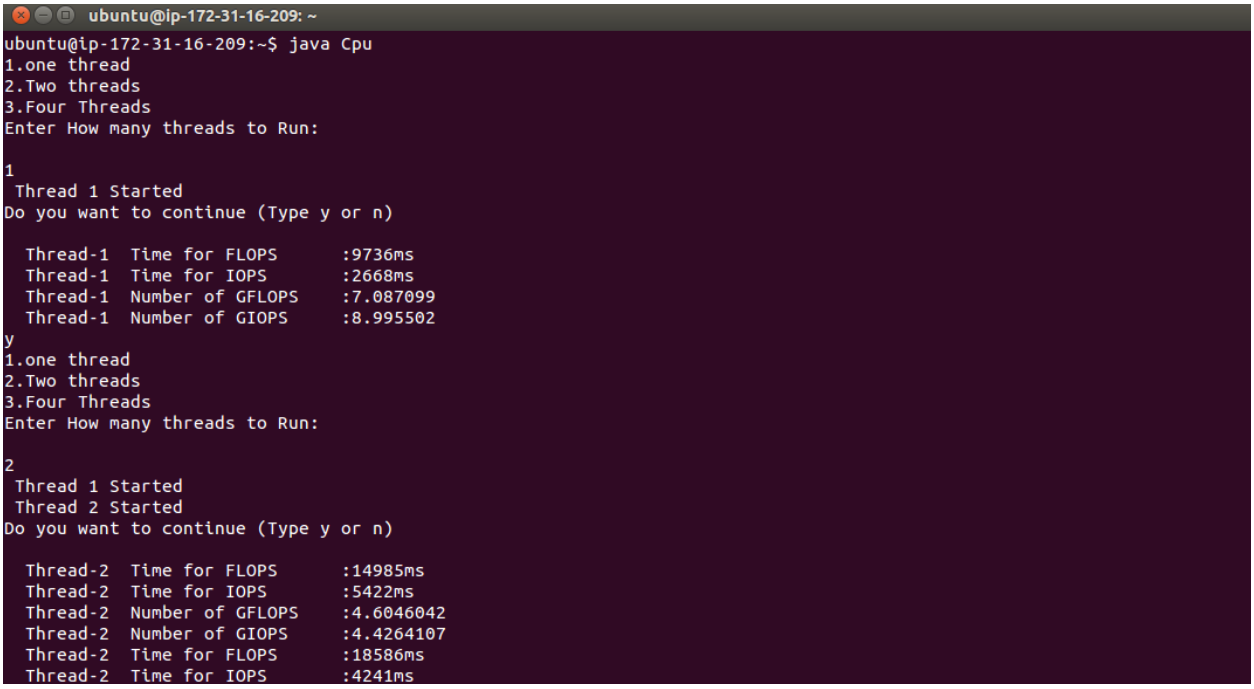
To execute the Main programs as follow:

1. **Cpu.java**

Cpu.java program can be executed and users would have the choice to enter the number of threads 1,2,4. Then User need to Select the option.

The program outputs the number of GFLOPS and GIOPS and the time for FLOPS and IOPS.

The sample output of the program would be like:



For 4 threads:

```
y
1.one thread
2.Two threads
3.Four Threads
Enter How many threads to Run:

3
 Thread 1 Started
 Thread 2 Started
 Thread 3 Started
 Thread 4 Started
Do you want to continue (Type y or n)

  Thread-4  Time for FLOPS      :25576ms
  Thread-4  Time for IOPS       :11450ms
  Thread-4  Number of GFLOPS    :2.697842
  Thread-4  Number of GIOPS     :2.09607
```

2. **Disk.java**

1.DiskSeq.java

To run the DiskSeq program,First Open terminal and Connect Server(t2.micro instance),Copy files to t2.micro instance and copy the file path.
and run the command **javac DiskSeq.java and java DiskSeq.**Select the BlockSize.

For BlockSize:1B

```
ubuntu@ip-172-31-16-209: ~
Testing Sequential R/W Speeds for Block Size    : 1 Bytes

Thread1 Write Speed  in Mbps    : 0.049756054
Thread1 Read  Speed  in Mbps    : 0.03235536272794741
Thread1 Latency Time in mSec    : 0.017329

Thread2 Write Speed  in Mbps    : 0.13235366
Thread2 Read  Speed  in Mbps    : 0.08762570096074333
Thread2 Latency Time in mSec    : 0.0072755
```

BlockSize:1024 Bytes

```
Testing Sequential R/W Speeds for Block Size    : 1024 Bytes

Thread1 Write Speed  in Mbps    : 40.480953
Thread1 Read  Speed  in Mbps    : 31.76226175762701
Thread1 Latency Time in mSec    : 0.023891

Thread2 Write Speed  in Mbps    : 69.69721
Thread2 Read  Speed  in Mbps    : 53.9373394824777
Thread2 Latency Time in mSec    : 0.0147225
```

BlockSize:1 Mb

```
Testing Sequential R/W Speeds for Block Size    : 1048576 Bytes

Thread1 Write Speed  in Mbps    : 55.438923
Thread1 Read  Speed  in Mbps    : 53.13804605453197
Thread1 Latency Time in mSec    : 0.032716

Thread2 Write Speed  in Mbps    : 206.45961
Thread2 Read  Speed  in Mbps    : 192.55505148922074
Thread2 Latency Time in mSec    : 0.0240895
```

2.DiskRandom.java

To run the DiskRandom program, First Open terminal and Connect Server(t2.micro instance),Copy files to t2.micro instance and copy the file path.

and run the command **javac DiskRaandom.java and java DiskRando .**Select the BlockSize.

For BlockSize:1B byte

```
Testing Random R/W Speeds for Block Size        : 1024 Bytes

Thread1 Write Speed  in Mbps    : 0.08153492
Thread1 Read  Speed  in Mbps    : 0.20526860194649021
Thread1 Latency Time in mSec    : 0.009937086

Thread2 Write Speed  in Mbps    : 0.17461306
Thread2 Read  Speed  in Mbps    : 0.1444653489528375
Thread2 Latency Time in mSec    : 0.009492011
```

For BlockSize:1024 Bytes

```
Testing Random R/W Speeds for Block Size        : 1024 Bytes

Thread1 Write Speed  in Mbps    : 0.08153492
Thread1 Read  Speed  in Mbps    : 0.20526860194649021
Thread1 Latency Time in mSec    : 0.009937086

Thread2 Write Speed  in Mbps    : 0.17461306
Thread2 Read  Speed  in Mbps    : 0.1444653489528375
Thread2 Latency Time in mSec    : 0.009492011
```

For BlockSize:1Mb

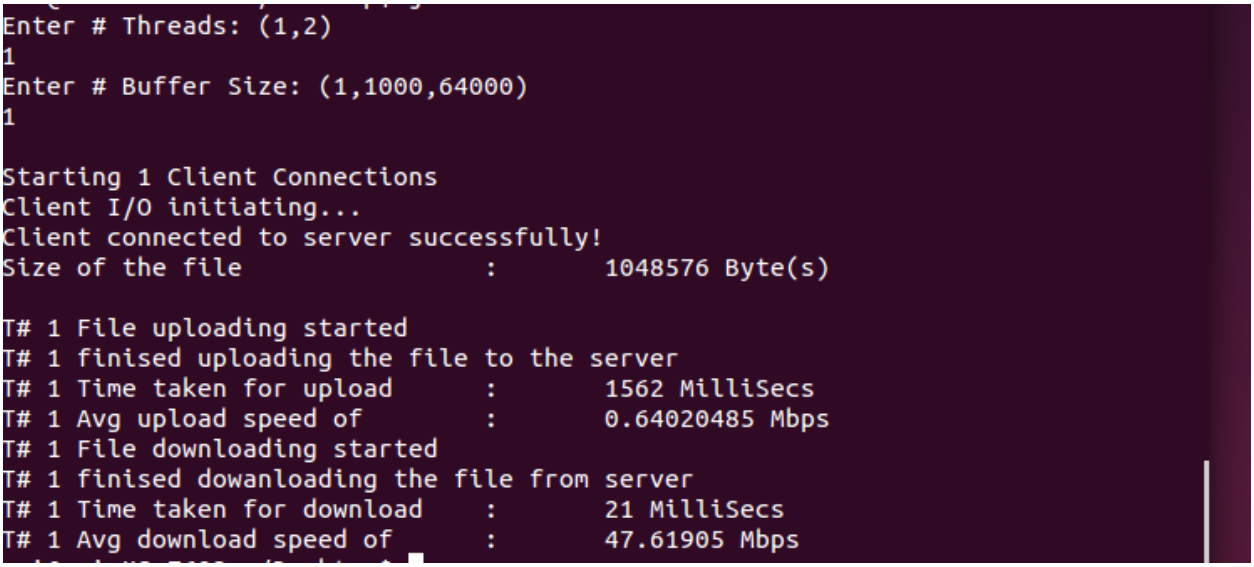
```
Testing Random R/W Speeds for Block Size        : 1048576 Bytes

Thread1 Write Speed  in Mbps    : 83.49176
Thread1 Read  Speed  in Mbps    : 210.19504839320598
Thread1 Latency Time in mSec    : 0.009937086

Thread2 Write Speed  in Mbps    : 178.80377
Thread2 Read  Speed  in Mbps    : 147.9325173277056
Thread2 Latency Time in mSec    : 0.009492011
```

3. **Network**

1. **TCP**

To run the Tcp program, First Open terminal and Connect Server(Two instances),Copy Client Program to one t2.micro instance and server program to another instance.
and run the command **javac PeerClient.java and java Peeraclient.**Select the Number of threads and BlockSize.

For BlockSize:1B byte



For BlockSize:1Kb byte

```
T# 1 File downloading started
T# 1 finised dowanloading the file from server
T# 1 Time taken for download    :       21 MilliSecs
T# 1 Avg download speed of      :       47.61905 Mbps
avi@avi-MS-7693:~/Desktop$ java Client
Enter # Threads: (1,2)
1
Enter # Buffer Size: (1,1000,64000)
1000

Starting 1 Client Connections
Client I/O initiating...
Client connected to server successfully!
Size of the file                :       1048576 Byte(s)

T# 1 File uploading started
T# 1 finised uploading the file to the server
T# 1 Time taken for upload      :       13 MilliSecs
T# 1 Avg upload speed of        :       76.92307 Mbps
T# 1 File downloading started
T# 1 finised dowanloading the file from server
T# 1 Time taken for download    :       17 MilliSecs
T# 1 Avg download speed of       :       58.823524 Mbps
```

For BlockSize:64KB byte

```
Enter # Threads: (1,2)
1
Enter # Buffer Size: (1,1000,64000)
64000

Starting 1 Client Connections
Client I/O initiating...
Client connected to server successfully!
Size of the file                :       1048576 Byte(s)

T# 1 File uploading started
T# 1 finised uploading the file to the server
T# 1 Time taken for upload      :       1 MilliSecs
T# 1 Avg upload speed of        :       999.99994 Mbps
T# 1 File downloading started
T# 1 finised dowanloading the file from server
T# 1 Time taken for download    :       23 MilliSecs
T# 1 Avg download speed of       :       43.47826 Mbps
avi@avi-MS-7693:~/Desktop$
```

Two threads:

```
Starting 2 Client Connections
Client I/O initiating...
Client connected to server successfully!
Size of the file                :       1048576 Byte(s)

T# 1 File uploading started
T# 2 File uploading started
T# 1 finised uploading the file to the server
T# 1 Time taken for upload      :       6940 MilliSecs
T# 1 Avg upload speed of        :       0.14409222 Mbps
T# 2 finised uploading the file to the server
T# 2 Time taken for upload      :       6959 MilliSecs
T# 2 Avg upload speed of        :       0.14369881 Mbps
T# 1 File downloading started
T# 2 File downloading started
T# 2 finised dowanloading the file from server
T# 1 finised dowanloading the file from server
T# 2 Time taken for download    :       21 MilliSecs
T# 1 Time taken for download    :       37 MilliSecs
T# 2 Avg download speed of       :       47.61905 Mbps
T# 1 Avg download speed of       :       27.027027 Mbps
avi@avi-MS-7693:~/Desktop$
```

Run the command **javac PeerServer.java** and **java PeerServer**.Select the Number of threads and BlockSize.

```
Server Input/Output initiating...
Server client connection establised successfully

Initiating Server to Client communication
Network I / O Transfer Time     :       3561 ms
Client to server upload completed!

Initiating Client to Server communication
Network I / O Transfer Time     :       21 ms
Server to Client download completed!
```

2. UDP

To run the Udp program, First Open terminal and Connect Server(Two instances),Copy Client Program to one t2.micro instance and server program to another instance.

and run the command **javac UClient.java and java Uclient.**Select the Number of threads and BlockSize.

One thread:

```
Client I/O initiating...
Size of the file : 10000 Bytes

File sent from client
Response from server:File has been recieved
Time Take for 1 Thread upload    : 87170 nanosec
Bandwidth for 1 Thread upload    : 114.0 Mbps
avi@avi-MS-7693:~/Desktop$
```

Two Threads:

```
File sent from client
Response from server:File has been recieved
Time Take for 1 Thread upload    : 87170 nanosec
Bandwidth for 1 Thread upload    : 114.0 Mbps
avi@avi-MS-7693:~/Desktop$ java Client
Client I/O initiating...
Size of the file : 10000 Bytes

File sent from client
Response from server:File has been recieved
Time Take for 1 Thread upload    : 71248 nanosec
Bandwidth for 1 Thread upload    : 140.0 Mbps
```

```
avi@avi-MS-7693:~/Desktop$ java Client
Client I/O initiating...
Size of the file : 10000 Bytes

File sent from client
Response from server:File has been recieved
Time Take for 1 Thread upload    : 57080 nanosec
Bandwidth for 1 Thread upload    : 175.0 Mbps
```

Run the command **javac PeerServer.java** and java **PeerServer**.Select the Number of threads and BlockSize.