

# CS553 Cloud Computing

## Design Docs

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## Introduction:

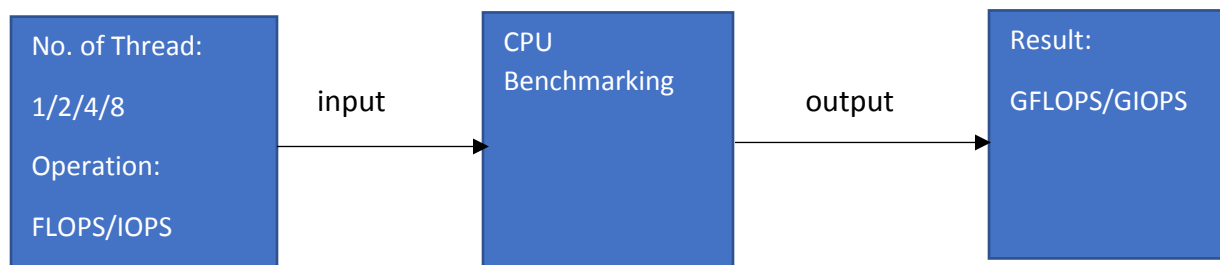
The project aims to benchmarking different part of computer system, from the CPU, GPU, memory, disk, and network. This benchmarking implemented using KVM virtual machine m1.medium (2 virtual processors with 4GB RAM and 40GB disk) and CentOS 7 Linux for the OS.

## Program Design:

The benchmarking system is develop using language C and for automation we are using bash scripting. All results like GFLOPS, GIOPS, Throughput, Latency are store in txt format and for generating plot we are using Tableau by processing txt file. All implementation is performed by turning on compiler optimizations.

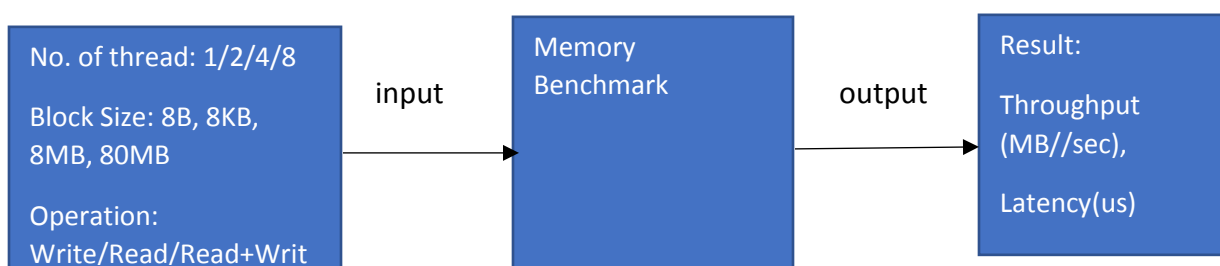
## CPU Benchmarking:

CPU benchmarking implemented using language C. Measure the processor speed in terms of double precision floating point operations per second (Giga FLOPS,  $10^9$  FLOPS) and integer operations per seconds (Giga IOPS,  $10^9$  IOPS). For more better performance GFLOPS and GIOPS calculated using AVX2 instructions. To achieved parallelism *Pthread* used at varying level of concurrency (1 thread, 2 thread, 4 thread, 8 thread). Also run CPU benchmark system for 10 min using 8 threads and take samples for FLOPS and IOPS. At last, run LINPACK benchmark is performed for comparing result.



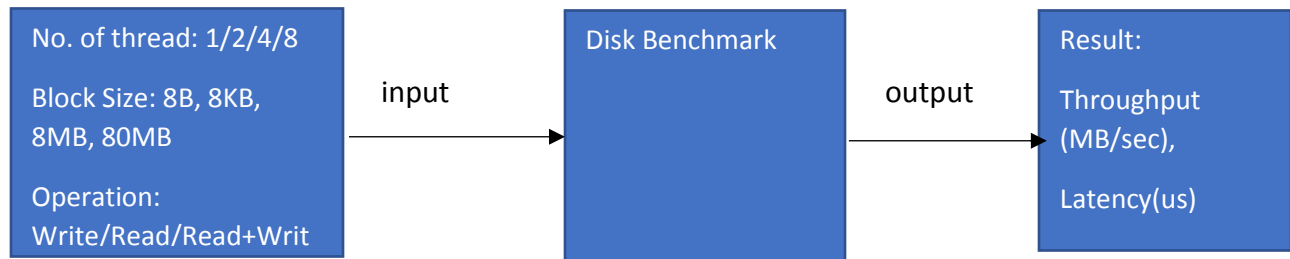
## Memory Benchmark:

Memory benchmarking implemented using language C. Measure the memory speed of host. For benchmarking performed different operation like write sequential, write random, read sequential, read random, read and write. *memset* function used for write while *memcpy* function used for read. To achieved parallelism *Pthread* used at varying level of concurrency (1 thread, 2 thread, 4 thread, 8 thread) and varying block size (8B, 8KB, 8MB, 80MB). For benchmarking throughput (MB/sec) and latency (us) are calculated. At last, run Stream benchmark for comparing result.



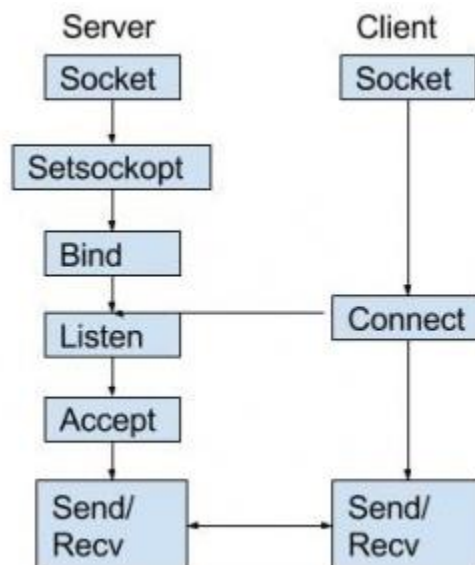
## Disk Benchmark:

Disk benchmarking implemented using language C. Measure the disk speed. For benchmarking performed different operation like write sequential, write random, read sequential, read random, read and write. *write* function used for write while *read* function used for read. To achieved parallelism *Pthread* used at varying level of concurrency (1 thread, 2 thread, 4 thread, 8 thread) and varying block size (8B, 8KB, 8MB, 80MB). For benchmarking throughput (MB/sec) and latency (ms) are calculated. At last, run IOZone benchmark for comparing result.



## Network Benchmark:

Network benchmark implemented using language C. Measure the network speed over the loopback interface card (1 node, between 2 processes on the same node). *Socket* programming used for communicating between client and server. Network benchmark implemented using communication type TCP and UDP, fixed packet/buffer size(64kb), and varying the concurrency (1 thread, 2 thread, 4 thread, 8 thread). For benchmarking throughput (MegaBits/sec) and latency (ms) are calculated. At last, run IPerf benchmark for comparing result.



Work Done:

CPU and Disk Benchmarking did by Shruti Gupta and rest of the part did by Sagar Mane.