AMAZON VM BENCHMARKING

1. OVERALL APPROACH AND METHOD TO BENCHMARK THE AMAZON EC2 INSTANCES

➢ Wrote shell scripts to run all benchmarks (CPU , I/O , I/O mixed) 5 times and collect result into file.

➢ Tested the scripts on an EC2 instance.

➢ Ran successfully on EC2 instances.

➢ Created AMI(Amazon machine image) from that instance with the shell scripts on it.

➢ Using the AMI , launched 5 instances of each (micro , small , medium , large).

➢ Used the preloaded Shell Script to Benchmark the instances.

2. BENCHMARK APPLICATIONS CHOSEN AND WHY? WHAT DO THESE TESTS DO AND WHAT DO THEIR RESULTS TELL US ABOUT THE SYSTEM ?

CPU BENCHMARKING - **LINPACK**

➢ The LINPACK Benchmark is a measure of a computer's floating-point rate of execution. Introduced by Jack Dongarra, they measure how fast a computer solves a dense n by n system of linear equations Ax = b, which is a common task in engineering.

➢ The aim is to approximate how fast a computer will perform when solving real problems.

➢ The latest version of these benchmarks is used to build the TOP500 list, ranking the world's most powerful supercomputers.

<u>I/O BENCHMARKING - **IOZONE**</u>

- ➢ IOzone is a filesystem benchmark tool.
- ➢ The benchmark generates and measures a variety of file operations.
- ➢ The benchmark tests file I/O performance for the following operations.
- ➢ **Read, write, re-read, re-write, read backwards, read strided, fread, fwrite, random read/write, pread/pwrite variants.**
- ➢ By using Iozone to get a broad filesystem performance coverage the buyer is much more likely to see any hot or cold spots and pick a platform and operating system that is more well balanced.

<u>CPU - I/O MIXED BENCHMARK - UNTAR A LARGE ARCHIVE FILE</u>

- ➢ We use large tar.gz file to Untar & measure elapsed time to untar a large file.
- ➢ Here we are using BRL-CAD – (Computer aided design tool) **tar.gz** of file size **267.1 MB**.

3. <u>ISSUES IN PERFORMING BENCHMARKS AND OVERCOMING THEM</u>

- ➢ Since the shell scripts automated the task and and AMI was created with it loaded, No issues were faced during process of benchmarking

4. CPU, MEMORY & DISK CHARACTERISTICS OF EACH OF THE VM INSTANCES, A SUMMARY

CPU :

	MICRO	SMALL	MEDIUM	LARGE
MODEL NAME	Intel(R) Xeon(R) CPU E5-2670 v2 @ 2.50GHz	Intel(R) Xeon(R) CPU E5-2676 v3 @ 2.40GHz	Intel(R) Xeon(R) CPU E5-2676 v3 @ 2.40GHz	Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz
NO. OF PROCESSORS	1	1	2	2
CACHE SIZE	30720 KB	30720 KB	30720 KB	46080 KB
THREADS(s) PER CORE	1	1	1	2
CORE(s) PER socket:	1	1	2	1

MEMORY :

	MICRO	SMALL	MEDIUM	LARGE
MEMTOTAL	1014460 KB	2046652 KB	4045012 KB	8173784 KB
BUFFERS	17280 kB	83620 kB	45592 kB	86316 kB
CACHED	265084 kB	400700 kB	370084 kB	734864 kB

DISK:

MICRO, SMALL, MEDIUM, LARGE:

Model: Xen Virtual Block Device (xvd)

Disk /dev/xvda: 8590MB

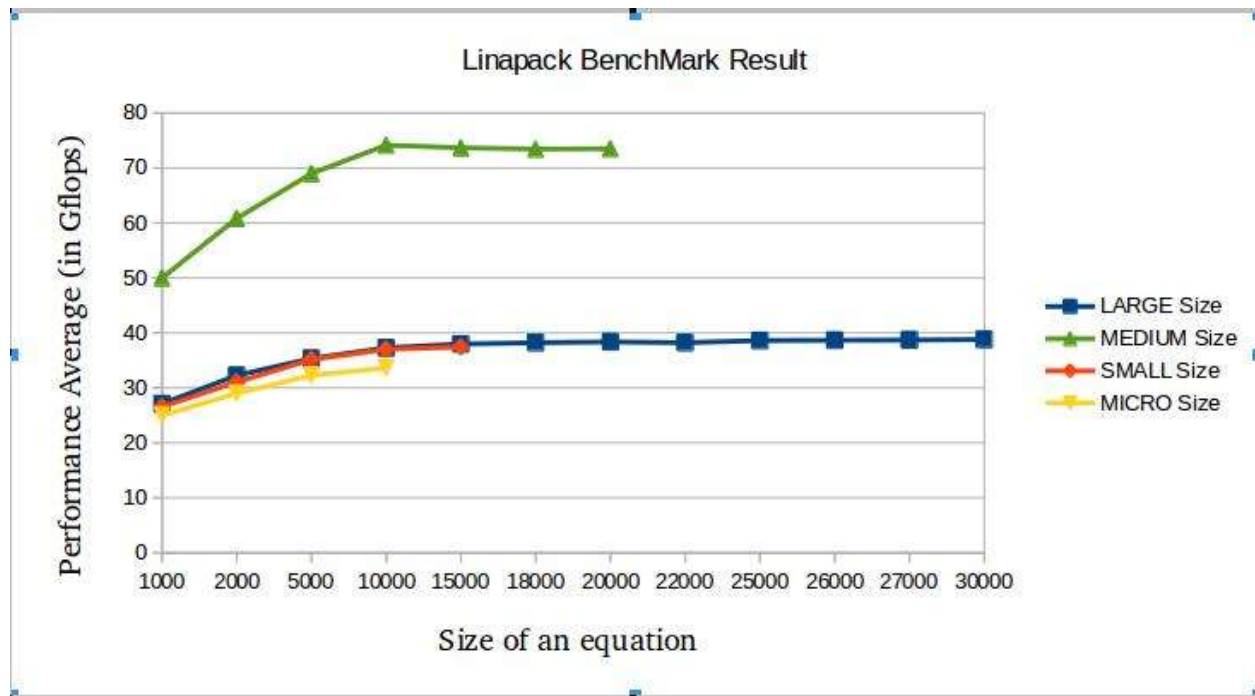Sector size (logical/physical): 512B/512B

Partition Table: MSDOS

DISK FLAGS:

Number	Start	End	Size	Type	File system	Flags
1	8225KB	8590MB	8582MB	primary	EXT4	boot

5. RESULTS OF BENCHMARK WITH GRAPHS. AND SURPRISING RESULTS
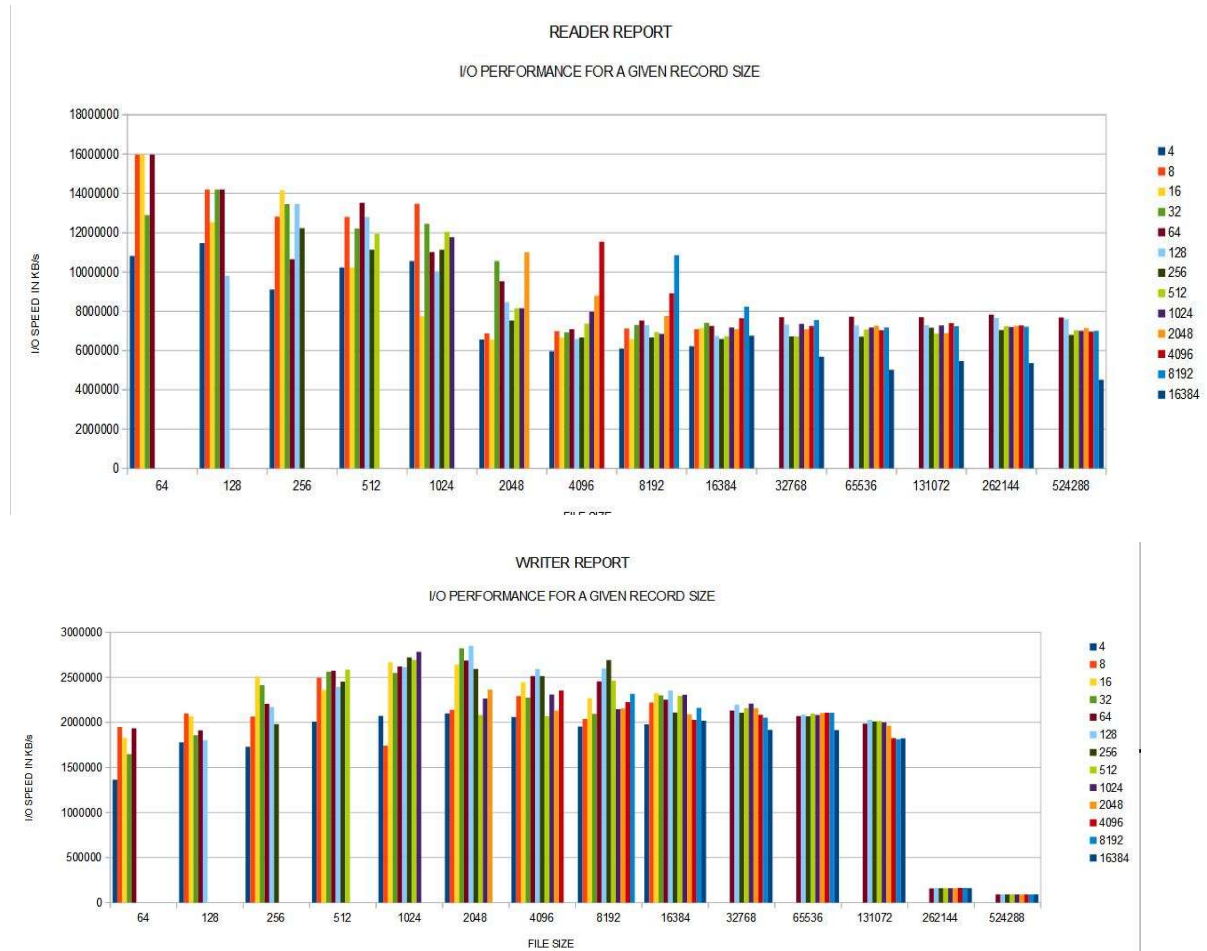
CPU BENCHMARKING - **LINPACK**

SURPRISING RESULT:

In case of Large instance it gives consistent performance and is also able to solve larger equations but the medium instances performs higher than large instance for smaller equation sizes but fails to solve large ones due to memory limitation
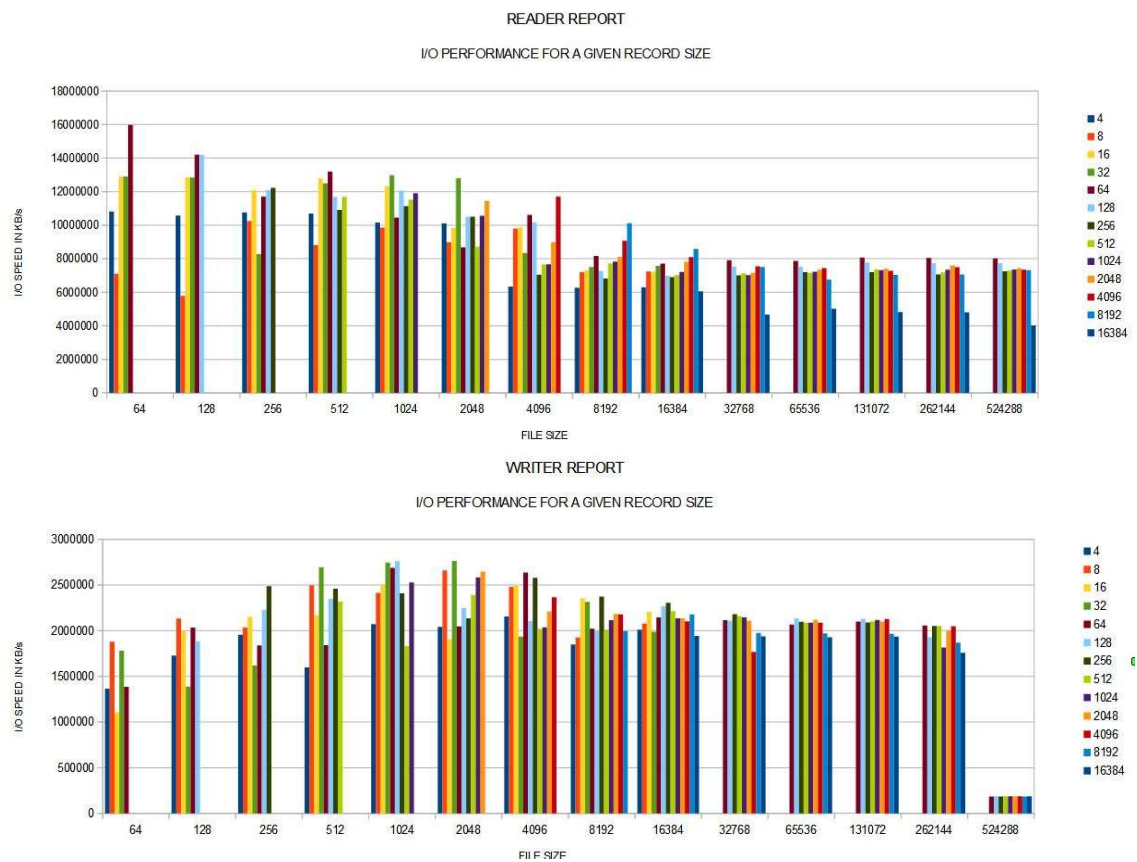
I/O BENCHMARKING – IOZONE

IOzone benchmarks a file system by breaking up a file of a given size into records. These records are written (or read) in a different way, according to the given test, until the file size is reached.
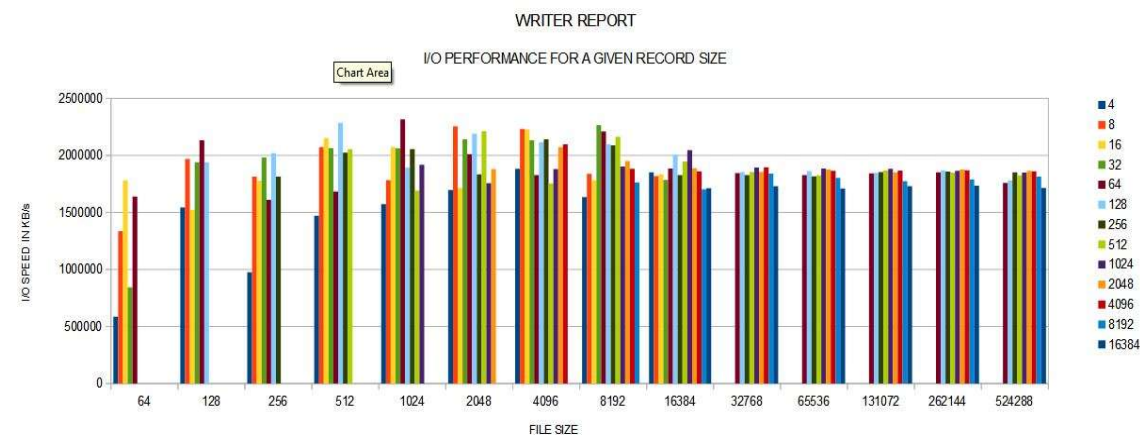
MICRO INSTANCE

READER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

WRITER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

SMALL INSTANCE:

READER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

WRITER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

MEDIUM INSTANCE

WRITER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

READER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

LARGE INSTANCE:

READER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

WRITER REPORT

I/O PERFORMANCE FOR A GIVEN RECORD SIZE

MIXED IO BENCHMARK:

<u>Time to untar file:</u>

MICRO: 14 seconds

SMALL: 13 seconds

MEDIUM: 9 seconds

LARGE: 7.5 seconds

6. <u>APPLICATIONS WELL-SUITED OR NOT A GOOD FIT FOR AMAZON EC2, , GIVEN THE RESULTS OF BENCHMARKING</u>

➢ T2 instances are <u>Burstable Performance Instances</u> that provide a baseline level of CPU performance with the ability to burst above the baseline. Instances in this family are ideal for applications that don't use the full CPU often or consistently, but occasionally need to burst (e.g. web servers, developer environments, and small databases).

➢ The Micro and Small instances can be used for development or jobs that doesn't handle huge number of requests. Maybe used for small scale applications.
➢ But the medium can be used for single tasks that focus on high performance.
➢ In case of the Large, it is multi threaded and can simultaneously run multiple jobs with good response time. So it can be used for web servers that handle a large number of Requests.

REFERENCES:

IOZONE:

http://www.iozone.org/docs/IOzone_msword_98.pdf

http://www.thegeekstuff.com/2011/05/iozone-examples

Linpack:

https://people.sc.fsu.edu/~jburkardt/c_src/linpack_bench/linpack_bench.html

https://www.samba.org/~ab/power-org-linpack