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CS4513 Project 2 Experimentation

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Design

System Conditions:

Local:

OS: Linux Mint 17 Qiana with kernel: 3.13.0-24-generic x86_64

CPU: Pentium G328 @ 4.4 Ghz

RAM : 8GB

SSD

Amazon Server:

Ubuntu

1 GB

Single core

SSD

Testing apparatus:

Setup and tear down: setupandteardown.sh which contains 10 calls of

`./client -s 54.175.86.195 -c "test" .` It was called with `time` 5 times.

The command here does not matter as it is not processed. The server was modified to:

`cout << "Setup and teardown" << endl;` which is sent to client by stdout redirection instead of calling `exec`.

Network throughput: ipref.log

In order to test throughput accurately of Amazon Cloud, the utility `iperf3` was used as it is designed for such tests. Due to the server needing to generally send the most data, its throughput sending data to client was used. In `Iperf3` by default the client sends data to the server, so on Amazon `iperf3 -c 130.215.243.156 -p 53000` was used. On my computer it was run with: `iperf3 -s -p 53000` . On Amazon the command was ran five times and the average values of it sending data for 10 seconds were recorded. See ipref.log.

CPU : cpuAmazon.log

With no other programs running

`sysbench --test=cpu --cpu-max-prime=20000 run`

was run on the server and the client.

IO:

Amazon: ioAmazon.log

`free -h` returned 448M free RAM on Amazon so 1GB file size was used with.

`sysbench --test=fileio --file-total-size=1G prepare`

`sysbench --test=fileio --file-total-size=1G --file-test-mode=rndrw --init-rng=on --max-time=30 --max-requests=0 run` was ran 3 times.

Local:

Results

Setup and tear down:

Trial #	Wall Clock in ms
1	193
2	191.5
3	186.2
4	217.2
5	221.2
Average	201.82
STDDEV	16.1276780722

Network throughput

Trial #	Mbits /sec
1	92.9
2	85
3	79.7
4	81.9
5	84.5
Average	84.8
STDDEV	5.0039984013

CPU:

Amazon

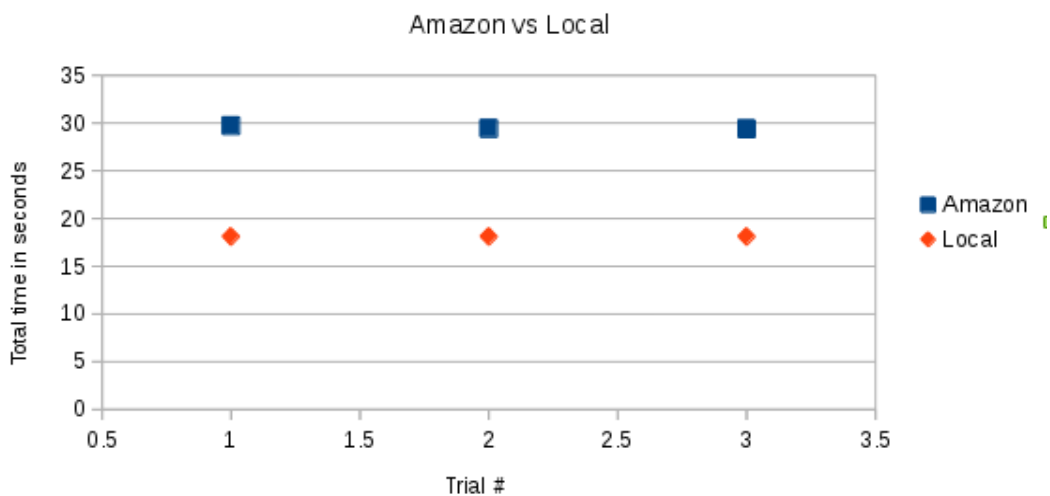
Trial #	Total time
1	29.7153
2	29.4319
3	29.3979
Average	29.515033333
STDDEV	0.1742671895

Local:

Trial #	Total time
1	18.1073
2	18.1105
3	18.1097
Average	18.109166667
STDDEV	0.0016653328

lower is better:

Comparison of CPU times



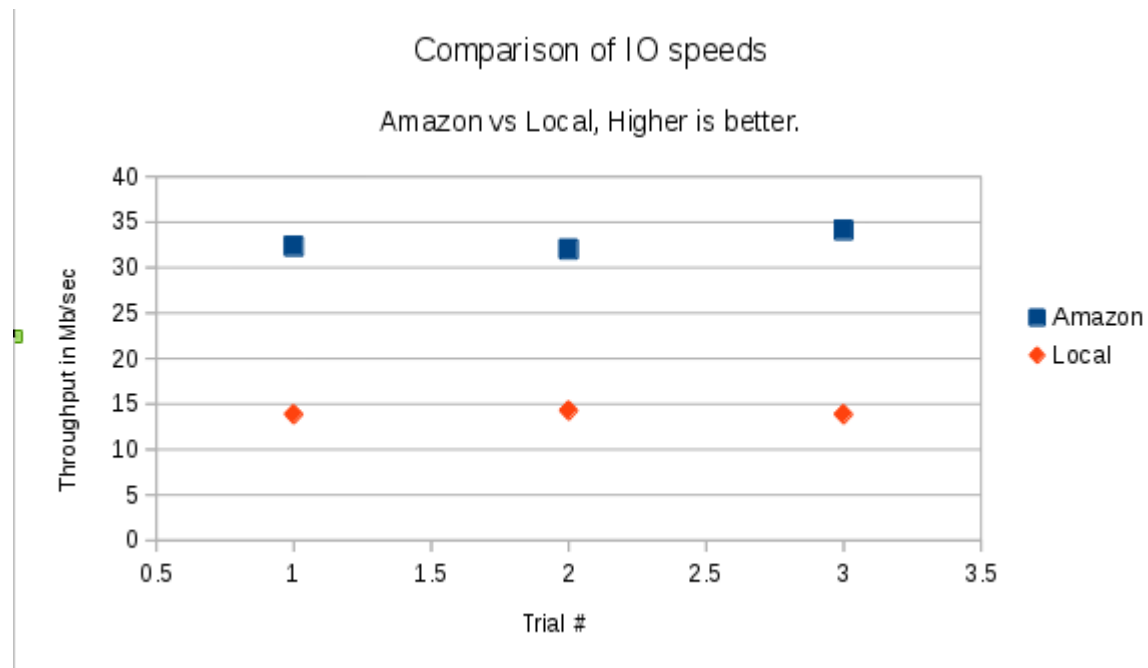
IO:

Amazon:

Trial #	Mb/s
1	32.343
2	32.018
3	34.114
Average	32.825
STDDEV	1.1280722495

Local:

Trial #	Mb/s
1	13.854
2	14.271
3	13.854
Average	13.993
STDDEV	0.2407550623



Analysis

Using the results, the following equation can be used to determine whether using Amazon EC2 cloud provides better performance than running locally:

$$\text{Local_CPU} + \text{Local_File_I/O} = n * \text{Network} + \text{Remote_CPU} + \text{Remote_File_I/O}$$

The average values were used for the calculation.

$$\text{Local_CPU} = 18.109166667$$

$$\text{Local_File_I/O} = 16\text{GB} / 13.993\text{Mb/s} = 1143.42886 \text{ seconds}$$

Network = 16gb /84.8megabits/s = 1509.43396 seconds

Remote_CPU = 29.5150333 seconds

Remote_File_I/O = 16GB/32.825 Mb/s = 487.433359 seconds

Local total = 1161.5 seconds

remote total = 516.9483923

n = (Local total - remote total)/network = 0.42

I must have interpreted this equation wrong as 0.42 doesn't make any sense. The question asked for all terms in time so network was calculated by dividing 16GB by throughput. Amazon appears to have faster disk than I had during my tests, but the CPU performance was not nearly as good as my processor. If the calculation worked out then it would show that network speed is not high enough for it to make sense to do all work on a networked server, but the time is approaching where it becomes more economical to do computing offsite.