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COEN 241
10/12/2021

HW 1

QEMU
Ubuntu 20.04_03 Server
10 GB Storage
2 GB Memory
Undefined | 1 CPU Core | 2 CPU Cores
No Hardware Acceleration

Docker
Allowed full resources
312 GB Storage
8 GB Memory
4 CPU Cores

○ Present main steps to enable a QEMU VM. In addition, please present the detailed QEMU commands, and VM configurations: 10 points

sudo apt-get install qemu # Install QEMU

sudo qemu-img create ubuntu.img 10G # Allocate space for the VM

Download a boot file to create VM with, like the Ubuntu ISO file

sudo qemu-system-x86_64 -hda ubuntu.img -boot d -cdrom ./ubuntu-20.04.3-live-server-amd64.iso -m 1536 # Initial boot/install of the VM with the iso file to the img file

sudo qemu-system-x86_64 -hda ubuntu.img -smp cores=2 -m 2048 # Start VM from stored img file

○ Present main steps to enable a Docker container. In addition, please describe the operations you use to manage Docker containers (and some other operations which you think are also important): 10 points

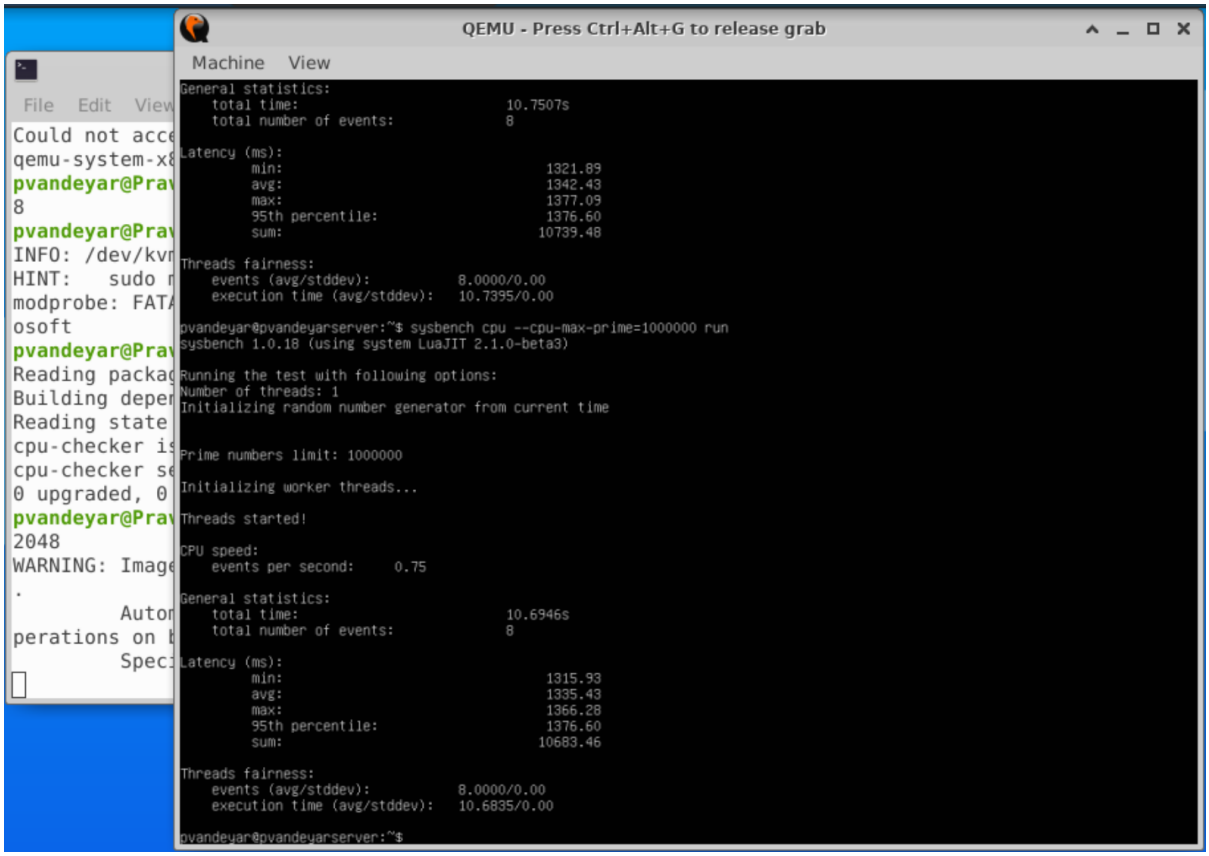
Install Docker # Docker Desktop

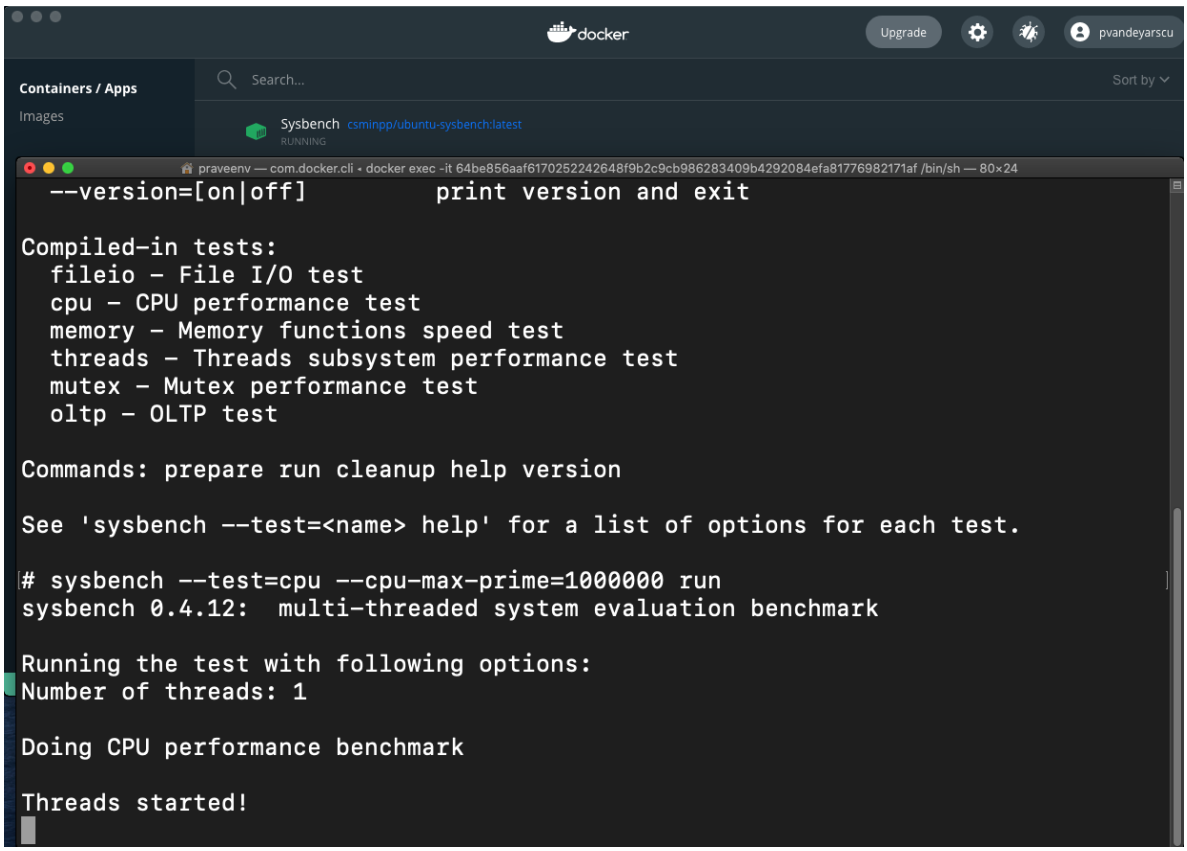
Start Docker Engine # Start the container engine consisting of the docker service and containerd service

Pull Sysbench image # Install the application

Run Sysbench # Run the application within a Docker container

Open CLI for Sysbench container # Interact with the application


QEMU - Press Ctrl+Alt+G to release grab
Machine View
File Edit View
General statistics:
total time: 10.7507s
total number of events: 8
Latency (ms):
min: 1321.89
avg: 1342.43
max: 1377.09
95th percentile: 1376.60
sum: 10739.48
Threads fairness:
events (avg/stddev): 8.0000/0.00
execution time (avg/stddev): 10.7395/0.00
pvandeyar@pvandeyarserver:~$ sysbench cpu --cpu-max-prime=1000000 run
sysbench 1.0.18 (using system LuaJIT 2.1.0-beta3)
Running the test with following options:
Number of threads: 1
Initializing random number generator from current time
Prime numbers limit: 1000000
Initializing worker threads...
Threads started!
CPU speed:
events per second: 0.75
General statistics:
total time: 10.6946s
total number of events: 8
Latency (ms):
min: 1315.93
avg: 1335.43
max: 1366.28
95th percentile: 1376.60
sum: 10683.46
Threads fairness:
events (avg/stddev): 8.0000/0.00
execution time (avg/stddev): 10.6835/0.00
pvandeyar@pvandeyarserver:~$


docker
Upgrade
pvandeyarscu
Containers / Apps
Images
Search...
Sort by
Sysbench csminpp/ubuntu-sysbench:latest
RUNNING
praveenv — com.docker.cli • docker exec -it 64be856aaf6170252242648f9b2c9cb986283409b4292084efa81776982171af /bin/sh — 80×24
--version=[on|off] print version and exit
Compiled-in tests:
fileio - File I/O test
cpu - CPU performance test
memory - Memory functions speed test
threads - Threads subsystem performance test
mutex - Mutex performance test
oltp - OLTP test
Commands: prepare run cleanup help version
See 'sysbench --test=<name> help' for a list of options for each test.
sysbench --test=cpu --cpu-max-prime=1000000 run
sysbench 0.4.12: multi-threaded system evaluation benchmark
Running the test with following options:
Number of threads: 1
Doing CPU performance benchmark
Threads started!

CPU

	Total Time	Min	Avg	Max	95th	Event STD
1000000						
2 GB	10.8627	1318.24	1356.48	1388.75	1376.60	8
1 CPU	10.9088	1350.74	1362.14	1369.99	1376.60	8
2 CPU	10.8781	1354.21	1359.16	1363.72	1352.03	8
Docker	10.0154	370.49	385.18	385.18	397.39	26
4000000						
2 GB	19.0182	9481.26	9503.71	9526.16	9452.83	2
1 CPU	19.0820	9451.63	9534.68	9617.74	9624.59	2
2 CPU	19.0476	9453.13	9521.46	9589.80	9624.59	2
Docker	10.9091	2650.44	2727.09	2770.88	2778.39	4
9000000						
2 GB	29.6797	29669.28	29669.28	29669.28	29926.15	1
1 CPU	30.0932	30082.30	30082.30	30082.30	29926.15	1
2 CPU	29.9495	29936.75	29936.75	29936.75	29926.15	1
Docker	17.2665	8616.82	8632.89	8648.97	8638.96	2

Memory instead of FileIO due to errors on QEMU machine

	Total Time	Min	Avg	Max	Event STD
5 GB Read					
2 GB	4.5837	0	0	1.37	5242880
1 CPU	4.7980	0.00	0.00	0.67	5242880
2 CPU	10.0009	0.00	0.00	10.89	1913983
Docker	10.0001	0.00	0.00	0.12	4619489
10 GB Read					
2 GB	9.2217	0	0	1.31	10485760
1 CPU	9.2312	0.00	0.00	0.68	10485760
2 CPU	10.0011	0.00	0.00	4.77	1920542
Docker	10.0001	0.00	0.00	1.53	4427045
5 GB Write					
2 GB	5.2739	0	0	14.96	5242880
1 CPU	5.0981	0.00	0.00	19.06	5242880
2 CPU	10.0026	0.00	0.00	1.40	1765795
Docker	10.0001	0.00	0.00	6.80	4383380

Scripts

```
#!/bin/bash

sysbench cpu --cpu-max-prime=1000000 run

sysbench cpu --cpu-max-prime=4000000 run

sysbench cpu --cpu-max-prime=9000000 run
```

```
#!/bin/bash

#Keep getting a fatal error for fileio in QEMU, one of the prepared files is said to be less than the minimum which changes when I change or remove an option

sysbench --test=fileio --file-total-size=4G prepare

sysbench --test=fileio --file-total-size=4G --file-test-mode=rndrw --max-time=180 --max-requests=0 --file-extra-flags=direct run

sysbench --test=fileio --file-total-size=4G cleanup
```

```
#!/bin/bash

sysbench --test=memory --memory-block-size=1K --memory-scope=global --memory-total-size=5G --memory-oper=read run

sysbench --test=memory --memory-block-size=1K --memory-scope=global --memory-total-size=10G --memory-oper=read run

sysbench --test=memory --memory-block-size=1K --memory-scope=global --memory-total-size=5G --memory-oper=write run
```

With the performance results, it can be seen that a container has better performance than a virtual machine all around. Unfortunately I couldn't get fileio to work, but it was interesting to see the memory results. It seems that for some reason 10 seconds is the minimum, and I would most likely have gotten better performance on Docker with higher test values.

https://github.com/pv-gitjob/coen241.git