Gmail **Heming Cui <chming82@gmail.com>**

Applying for publishing benchmarking related to vSphere 6.5 Fault Tolerance

Todd Muirhead <tmuirhead@vmware.com> Tue, May 23, 2017 at 11:53 PM
To: Wang Cheng <wangch.will@gmail.com>
Cc: benchmark <benchmark@vmware.com>, "CHEN, XUSHENG" <chenxus@connect.hku.hk>, Heming Cui <heming@cs.hku.hk>

Cheng,

Thanks for sending over the final version of your academic paper on Plover. Your inclusion of vSphere FT performance data in this paper is consistent with our standards for publishing for academic papers. You are OK to publish per our EULA.

Thanks,

Todd

From: Wang Cheng [mailto:wangch.will@gmail.com]
Sent: Sunday, May 21, 2017 10:11 AM
To: Todd Muirhead <tmuirhead@vmware.com>
Cc: benchmark <benchmark@vmware.com>; CHEN, XUSHENG <chenxus@connect.hku.hk>; Heming Cui <heming@cs.hku.hk>
Subject: Re: [Benchmark] Applying for publishing benchmarking related to vSphere 6.5 Fault Tolerance

Hi Todd,

We compared vSphere 6.5 FT with our own system - Plover (paper is attached below).

Plover

Plover is a fault-tolerance system built on top of KVM. In Plover, secondary runs concurrently with the primary and they receive the same total order of network input packets. When Plover detects the server program running in VM becomes idle, a synchronization between primary and secondary is invoked. During a synchronization, the primary only needs to transfer the divergent dirty pages to the secondary.

Benchmarking Details

Below are some details of our benchmarking on vSphere 6.5 Fault Tolerance and Plover.

Table 1 shows our performance results of Plover and vSphere running SSDB with different workloads (size of key space).

size of key space	vSphere FT	Plover	unreplicated execution on KVM
-r 100	6162.13 req/s	16875.52 req/s	23789.89 req/s
-r 100000	4734.61 req/s	15546.15 req/s	18958.2 req/s
-r 100000000	3985.65 req/s	14935.95 req/s	18069.56 req/s

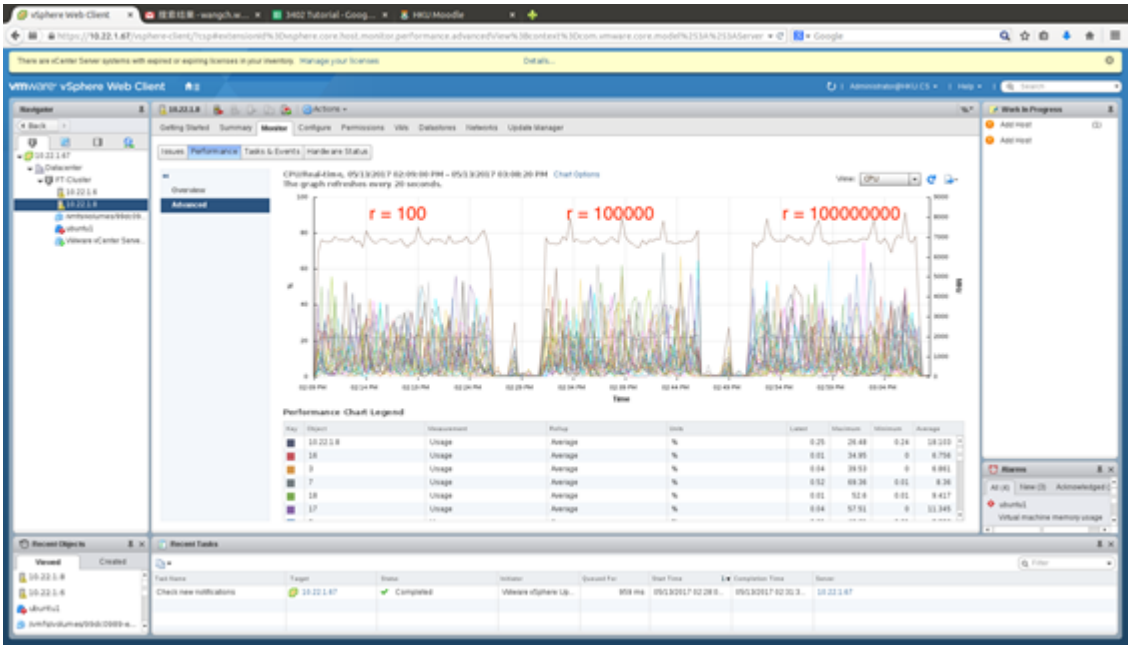
Table 1

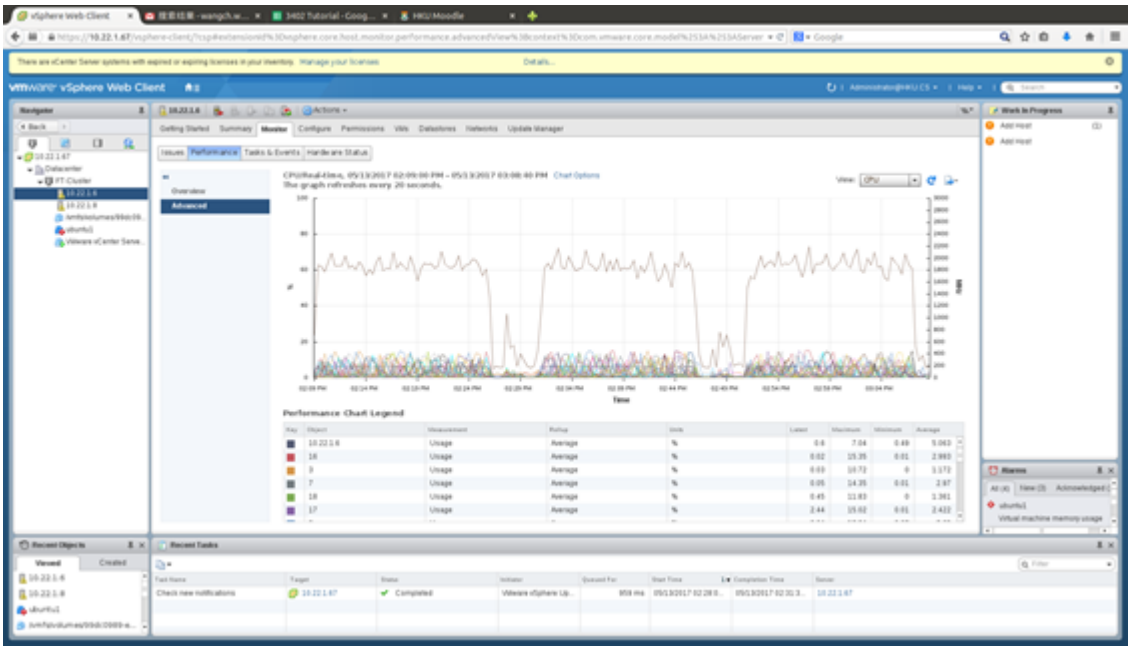
Table 2 shows the number of dirty pages for a synchronization and the same rate of dirty pages found in Plover.

size of key space	# of dirty pages	same rate
-r 100	5921	80%
-r 100000	11203	75%
-r 100000000	13026	74%

Table 2

The figures below are the bandwidth consumption and CPU usages of running SSDB with different workloads on vSphere hosts.





Performance Analysis

As you can see from table 1, the throughput of vSphere drops down when size of key space increases. We think this drop comes from the number of dirty pages (verified in table 2) and the saturated bandwidth (bandwidth figure).

On the other hand, since the same rate of dirty pages is very high during a synchronization (table 2), Plover only needs to transfer a very small amount of dirty pages. Therefore, Plover's throughput in table 1 did not go down too much.

We also ran a smaller workload to test vSphere and found the bandwidth consumption of vSphere increases with the size of key space.

If you need more results, please feel free to contact me.

2017-04-27 22:56 GMT+07:00 Todd Muirhead <tmuirhead@vmware.com>:

> Cheng,
>
> Thank you for submitting this request for review of your benchmark results. We would like to review the actual paper that will be published. Can you please send the full document that will contain these results?
>
> In regards to the numbers that you have provided, I have some questions. Are these numbers with FT enabled? Are these numbers going to be compared against a virtual machine not using FT? What was the CPU usage on both hosts? What amount of bandwidth was consumed on the FT interconnect NIC?
>
> Thanks,
>
> Todd Muirhead
>
> VMware Performance
>
> **From:** benchmark-bounces@vmware.com [mailto:benchmark-bounces@vmware.com] **On Behalf Of** Wang Cheng
> **Sent:** Thursday, April 27, 2017 6:48 AM
> **To:** benchmark <benchmark@vmware.com>
> **Cc:** CHEN, XUSHENG <chenxus@connect.hku.hk>; Heming Cui <heming@cs.hku.hk>
> **Subject:** [Benchmark] Applying for publishing benchmarking related to vSphere 6.5 Fault Tolerance
>
> Dear Sir or Madam,
>
> This is Cheng, a PhD student from The University of Hong Kong (HKU).
>
> I'm writing to apply for the approval of publishing a benchmark result related to VMware vSphere 6.5 Fault Tolerance (FT) feature. The goal of our benchmarking is to test the performance of vSphere FT feature under the workloads which would dirty different number of memory pages.
>
> Below are the details of our benchmarking.
>
> **Hardware**:
>
> - Dell R430 servers: 2.6 GHz Intel Xeon CPU with 24 hyper-threading cores, 64GB memory, 1TB SSD
> - NIC: Mellanox ConnectX-3 Pro 40Gbps connected with RoCE.
>
> **Host Operating System**:
>
> - VMware ESXi 6.5

Guest VM:

- Ubuntu 16.04 (64-bit), 16GB memory, 4 CPUs

Benchmarking Program:

We ran a key-value store SSDB (default configuration) in the VM and spawned a redis-benchmark on a remote host. The benchmark command is as following:

- $ redis-benchmark -n 1000000 -c 8 -P 500 -t SET -r RANGE

RANGE is the size of the key space.

The benchmark results are shown below:

RANGE	Throughput (requests/sec)
-r 100	6162.13
-r 100000	4734.61
-r 100000000	3985.65

If necessary, I'm happy to provide the access to our machines so that you can log in and verify the results.

Looking forward to your reply. Many thanks for your time.

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Regards,

Wang Cheng

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Wang Cheng