Performance Analysis of Virtual Storage

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ABSTRACT

Virtual machine technology enables multiple hosts to share the same LUN(Logical Unit Number) and the same storage, but if too many hosts share the same LUN, it will increase the delay. In this paper we propose a performance model, get several values of scalable storage performance in virtual environment, and present the results examined the effects of I/O queuing in a virtual infrastructure. This results show how to make the most effective use of our storage resources.

keywords: $ALT = \frac{TLT}{n}$ LUN, latency, Queue depth, Simpy, Virtual machine.

I. INTRODUCTION

Virtual technology enables multiple hosts to share the same LUN and the same physical storage[1]. The LUN queue depth that determines how many commands can be active at one time[2], so if multiple hosts generate commands that exceed the LUN depth, the excess commands are queued in the kernel, this increases the latency[3]. We must understand the storage performance limits of a given physical environment to ensure that we do not over commit resources[4].

II. SYSTEM MODEL AND METHODS

We propose a simple system model as shown in Fig 1. In this model, host generates two kinds of commands Read(R), Write(W) with respective rates λ_R, λ_W, each different command carries the same size data is 0.5GB, when these commands generated, the commands put it into the LUN queue(Q_L) in sequence and wait for service's response. The commands in Q_L request server, after receiving the command request, server request disk as the command needs, disk processes the different kinds of commands with different processing speed. The processing speed of the read command and the write command in the disk is defined as V_R, V_W , the disk has 500GB of data processing capability .

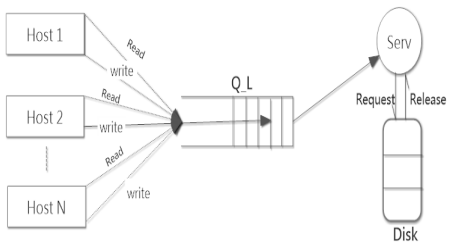

Fig.1 System Model

The latency for each command includes waiting time in queueing and processing time in disk. Based on the system model, using python, we can get the total number and the latency of commands processed by the system during the simulation time. if the total latency time of commands is TLT, the total number of commands is n, then the average latency time(ALT) : (1)

III. RESULTS

The parameters we used show in Table 1.

Parameters	Meaning	Values
λ_R	Read command generating rate	18
λ_W	Write command generating rate	12
V_R	Read command processing speed	5Gbps
V_W	Write command processing speed	4Gbps
Scom	The size of the data carried by each command	0.5GB
Sdis	The total size of the Disk	500GB
N	How many Hosts share the same LUN(Q_L)	[1,10]
Q_L depth	How many commands can be active at one time to Q_L	{32/64}

Table 1. Simulation Parameters Based on the system model, by changing the number of hosts, we can get the average latency time when the LUN depth is 32 and 64 respectively. Using the average latency time when the LUN depth is 32 and 64 respectively. Using the average latency data we can draw the average latency time graph show in Fig 2.

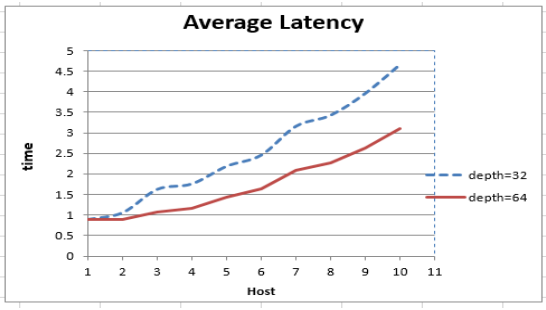

Fig.2 Latency Graph

IV. DISCUSSION AND CONCLUSIONS

A virtualized environment makes effective use of available resources. Through simulation tests, we can conclude that when many hosts want to use the same LUN, the increase in the number of commands generated by the host may exceed the queue depth of the LUN, it causing more latency, and at the same time, if the number of commands generated by host is fixed. the depth of the queue is greater, latency can be reduced.

▮ References ▮

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