Subject: dm-band: The I/O bandwidth controller: Performance Report
Posted by Ryo Tsuruta on Fri, 25 Jan 2008 07:07:20 GMT
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Hi,

Now I report the result of dm-band bandwidth control test I did yesterday.
I've got really good results that dm-band works as I expected. I made
several band-groups on several disk partitions and gave them heavy I/O loads.

Hardware Spec.
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DELL Dimention E521:

```
Linux kappa.local.valinux.co.jp 2.6.23.14 #1 SMP
  Thu Jan 24 17:24:59 JST 2008 i686 athlon i386 GNU/Linux
Detected 2004.217 MHz processor.
CPU0: AMD Athlon(tm) 64 X2 Dual Core Processor 3800+ stepping 02
Memory: 966240k/981888k available (2102k kernel code, 14932k reserved,
  890k data, 216k init, 64384k highmem)
scsi 2:0:0:0: Direct-Access     ATA      ST3250620AS     3.AA PQ: 0 ANSI: 5
sd 2:0:0:0: [sdb] 488397168 512-byte hardware sectors (250059 MB)
sd 2:0:0:0: [sdb] Write Protect is off
sd 2:0:0:0: [sdb] Mode Sense: 00 3a 00 00
sd 2:0:0:0: [sdb] Write cache: enabled, read cache: enabled,
  doesn't support DPO or FUA
sdb: sdb1 sdb2 < sdb5 sdb6 sdb7 sdb8 sdb9 sdb10 sdb11 sdb12 sdb13 sdb14
  sdb15 >
```

The results of bandwidth control test on partitions
==========

The configurations of the test #1:
- o Prepare three partitions sdb5, sdb6 and sdb7.
- o Give weights of 40, 20 and 10 to sdb5, sdb6 and sdb7 respectively.
- o Run 128 processes issuing random read/write direct I/O with 4KB data
  on each device at the same time.
- o Count up the number of I/Os and sectors which have done in 60 seconds.

The result of the test #1

device	sdb5	sdb6	sdb7
weight	40 (57.0%)	20 (29.0%)	10 (14.0%)
I/Os (r/w)	6640(3272/ 3368)	3434(1719/ 1715)	1689(857/ 832)
sectors (r/w)	53120(26176/26944)	27472(13752/13720)	13512(6856/6656)
ratio to total	56.4%	29.2%	14.4%

The configurations of the test #2:
  o The configurations are the same as the test #1 except this test doesn't
    run any processes issuing I/Os on sdb6.

The result of the test #2

device	sdb5	sdb6	sdb7
weight	40 (57.0%)	20 (29.0%)	10 (14.0%)
I/Os (r/w)	9566(4815/ 4751)	0(0/ 0)	2370(1198/1172)
sectors (r/w)	76528(38520/38008)	0(0/ 0)	18960(9584/9376)
ratio to total	76.8%	0.0%	23.2%

The results of bandwidth control test on band-groups.
==========
The configurations of the test #3:
  o Prepare three partitions sdb5 and sdb6.
  o Create two extra band-groups on sdb5, the first is of user1 and the
    second is of user2.
  o Give weights of 40, 20, 10 and 10 to the user1 band-group, the user2
    band-group, the default group of sdb5 and sdb6 respectively.
  o Run 128 processes issuing random read/write direct I/O with 4KB data
    on each device at the same time.
  o Count up the number of I/Os and sectors which have done in 60 seconds.

The result of the test #3

dev	sdb5			sdb6
usr	user1	user2	other users	all users
wgt	40 (50.0%)	20 (25.0%)	10 (12.5%)	10 (12.5%)
I/O	5951(2940/ 3011)	3068(1574/ 1494)	1663(828/ 835)	1663(810/ 853)
sec	47608(23520/24088)	24544(12592/11952)	13304(6624/6680)	13304(6480/6824)
%	48.2%	24.9%	13.5%	13.5%

The configurations of the test #4:
  o The configurations are the same as the test #3 except this test doesn't
    run any processes issuing I/Os on the user2 band-group.

The result of the test #4

dev	sdb5			sdb6

|usr| user1 | user2 | other users | all users |
|wgt| 40 (50.0%) | 20 (25.0%) | 10 (12.5%) | 10 (12.5%) |
|---+---+---+---+---|
|I/O| 8002(3963/ 4039)| 0(0/ 0)| 2056(1021/1035)| 2008(998/1010)|
|sec|64016(31704/32312)| 0(0/ 0)|16448(8168/8280)|16064(7984/8080)|
| % | 66.3% | 0.0% | 17.0% | 16.6% |

Conclusions and future works
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Dm-band works well with random I/Os. I have a plan on running some tests
using various real applications such as databases or file servers.
If you have any other good idea to test dm-band, please let me know.

Thank you,
Ryo Tsuruta.

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