Lustre Benchmarking Notes

Base Drive Benchmarks

Backing OST drive - Samsung MZILS1T9HEJH/007

```
fio --name TEST --filename=/mnt/ost0/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --fsync=1
--direct=1 --numjobs=1
```

Random Read with O_DIRECT: bw=663MiB/s (695MB/s), 663MiB/s-663MiB/s (695MB/s-695MB/s)

```
fio --name TEST --filename=/mnt/ost0/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --fsync=1
--direct=1 --numjobs=1
```

Random Write with O_DIRECT: bw=414MiB/s (434MB/s), 414MiB/s-414MiB/s (434MB/s-434MB/s), io=128GiB (137GB), run=316847-316847msec

```
fio --name TEST --filename=/mnt/ost0/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Read with O_DIRECT: bw=664MiB/s (696MB/s), 664MiB/s-664MiB/s (696MB/s-696MB/s), io=128GiB (137GB), run=197401-197401msec

```
fio --name TEST --filename=/mnt/ost0/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Write with O_DIRECT: bw=635MiB/s (666MB/s), 635MiB/s-635MiB/s (666MB/s-666MB/s), io=128GiB (137GB), run=206497-206497msec

```
[root@mawenzi-01 ~]# crglo=1 crghi=8 thrlo=1 thrhi=8 size=305176 rslt_loc=/root/sgpdd_output scsidevs="m01:/dev
/sdd" sgpdd-survey
Thu Jul 20 08:10:25 MDT 2023 sgpdd-survey on m01:/dev/sdd from mawenzi-01
dev  1 sz 312500224K rsz 1024K crg     1 thr     1 write  580.75 [  580.95,  580.95]  read  708.46 [
708.75,  708.75]
dev  1 sz 312500224K rsz 1024K crg     1 thr     2 write  857.39 [  857.83,  857.83]  read  895.62 [
896.10,  896.10]
dev  1 sz 312500224K rsz 1024K crg     1 thr     4 write  966.00 [  966.57,  966.57]  read  947.48 [
948.02,  948.02]
dev  1 sz 312500224K rsz 1024K crg     1 thr     8 write 1001.49 [ 1002.09, 1002.09]  read  948.73 [
949.26,  949.26]
dev  1 sz 312500224K rsz 1024K crg     2 thr     2 write  872.05 [  436.26,  436.26]  read  898.33 [
449.40,  449.42]
dev  1 sz 312500224K rsz 1024K crg     2 thr     4 write  978.17 [  489.37,  490.13]  read  955.58 [
478.06,  478.08]
dev  1 sz 312500224K rsz 1024K crg     2 thr     8 write  990.96 [  495.78,  495.81]  read  950.30 [
475.42,  475.72]
dev  1 sz 312500224K rsz 1024K crg     4 thr     4 write 1010.59 [  252.80,  254.55]  read  943.21 [
235.93,  236.01]
dev  1 sz 312500224K rsz 1024K crg     4 thr     8 write  995.51 [  249.02,  250.02]  read  952.72 [
238.31,  238.33]
dev  1 sz 312500224K rsz 1024K crg     8 thr     8 write 1016.62 [  127.15,  128.00]  read  952.23 [
119.09,  119.11]
```

The number right after write is the bandwidth in MiB/s from `total data / elapsed time`

The numbers in the brackets are the min and max (there's really no other information in the script)

PCC Cache NVMe drive - MZXL51T6HBJR-000H3__1

```
fio --name TEST --filename=/mnt/temp/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --fsync=1
--direct=1 --numjobs=1
```

Random Read with O_DIRECT: bw=2264MiB/s (2374MB/s), 2264MiB/s-2264MiB/s (2374MB/s-2374MB/s), io=128GiB (137GB), run=57897-57897msec

```
fio --name TEST --filename=/mnt/temp/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --fsync=1
--direct=1 --numjobs=1
```

Random Write with O_DIRECT: bw=2405MiB/s (2522MB/s), 2405MiB/s-2405MiB/s (2522MB/s-2522MB/s), io=128GiB (137GB), run=54492-54492msec

```
fio --name TEST --filename=/mnt/temp/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Read with O_DIRECT: bw=2174MiB/s (2280MB/s), 2174MiB/s-2174MiB/s (2280MB/s-2280MB/s), io=128GiB (137GB), run=60285-60285msec

```
fio --name TEST --filename=/mnt/temp/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Write with O_DIRECT: bw=2382MiB/s (2498MB/s), 2382MiB/s-2382MiB/s (2498MB/s-2498MB/s), io=128GiB (137GB), run=55029-55029msec

DD Benchmarks

Average of 5 runs

Non-PCC

1G File - 339.4 MB/s

5G File - 401.8 MB/s

10G File - 480.8 MB/s

50G File - 447.6 MB/s

Non-PCC oflag=direct

1G File - 8.18 MB/s

PCC

1G File - 873.6 MB/s

5G File - 1.16 GB/s

10G File - 1.173 GB/s

50G File - 1.0184 GB/s

PCC oflag=direct

1G File - 219.4 MB/s

Iozone

non-pcc-iozone-output.wks

pcc-iozone-output.wks

Fio Benchmarks Single Client

Non-PCC

```
fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --
fsync=1 --direct=1 --numjobs=1
```

Random Read with O_DIRECT: bw=404MiB/s (423MB/s), 404MiB/s-404MiB/s (423MB/s-423MB/s), io=128GiB (137GB), run=324615-324615msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --
fsync=1 --direct=1 --numjobs=1
```

Random Write with O_DIRECT: bw=244MiB/s (256MB/s), 244MiB/s-244MiB/s (256MB/s-256MB/s), io=128GiB (137GB), run=537032-537032msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Read with O_DIRECT: bw=402MiB/s (422MB/s), 402MiB/s-402MiB/s (422MB/s-422MB/s), io=128GiB (137GB), run=325723-325723msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Write with O_DIRECT: bw=274MiB/s (287MB/s), 274MiB/s-274MiB/s (287MB/s-287MB/s), io=128GiB (137GB), run=478771-478771msec

PCC

```
fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --
fsync=1 --direct=1 --numjobs=1
```

Random Read with O_DIRECT: bw=2266MiB/s (2376MB/s), 2266MiB/s-2266MiB/s (2376MB/s-2376MB/s), io=128GiB (137GB), run=57851-57851msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --
fsync=1 --direct=1 --numjobs=1
```

Random Write with O_DIRECT: bw=1928MiB/s (2022MB/s), 1928MiB/s-1928MiB/s (2022MB/s-2022MB/s), io=128GiB (137GB), run=67971-67971msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Read with O_DIRECT: bw=1899MiB/s (1991MB/s), 1899MiB/s-1899MiB/s (1991MB/s-1991MB/s), io=128GiB (137GB), run=69036-69036msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=128g --blocksize=1024k --ioengine=libaio --
fsync=10000 --direct=1 --numjobs=1
```

Sequential Write with O_DIRECT: bw=2284MiB/s (2395MB/s), 2284MiB/s-2284MiB/s (2395MB/s-2395MB/s), io=128GiB (137GB), run=57397-57397msec

Fio Benchmarks Single Client - Small I/O

Non-PCC

```
fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=1g --ioengine=libaio --fsync=1 --direct=1 --
numjobs=1
```

Random Read with O_DIRECT: bw=15.8MiB/s (16.6MB/s), 15.8MiB/s-15.8MiB/s (16.6MB/s-16.6MB/s), io=1024MiB (1074MB), run=64786-64786msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=1g --ioengine=libaio --fsync=1 --direct=1 --
numjobs=1
```

Random Write with O_DIRECT: bw=6949KiB/s (7116kB/s), 6949KiB/s-6949KiB/s (7116kB/s-7116kB/s), io=1024MiB (1074MB), run=150887-150887msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=1g --ioengine=libaio --fsync=10000 --direct=1 --
numjobs=1
```

Sequential Read with O_DIRECT: bw=15.6MiB/s (16.3MB/s), 15.6MiB/s-15.6MiB/s (16.3MB/s-16.3MB/s), io=1024MiB (1074MB), run=65774-65774msec

```
fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=1g --ioengine=libaio --fsync=10000 --direct=1 --
numjobs=1
```

Sequential Write with O_DIRECT: bw=10.2MiB/s (10.7MB/s), 10.2MiB/s-10.2MiB/s (10.7MB/s-10.7MB/s), io=1024MiB (1074MB), run=99912-99912msec

IOdepth testing (Used Random Write Command)

iodepth=1 WRITE: bw=7315KiB/s (7491kB/s), 7315KiB/s-7315KiB/s (7491kB/s-7491kB/s), io=1024MiB (1074MB), run=143344-143344msec
iodepth=2 WRITE: bw=11.0MiB/s (11.6MB/s), 11.0MiB/s-11.0MiB/s (11.6MB/s-11.6MB/s), io=1024MiB (1074MB), run=92710-92710msec
iodepth=4 WRITE: bw=11.1MiB/s (11.6MB/s), 11.1MiB/s-11.1MiB/s (11.6MB/s-11.6MB/s), io=1024MiB (1074MB), run=92631-92631msec
iodepth=8 WRITE: bw=11.0MiB/s (11.5MB/s), 11.0MiB/s-11.0MiB/s (11.5MB/s-11.5MB/s), io=1024MiB (1074MB), run=93015-93015msec
iodepth=16 WRITE: bw=10.9MiB/s (11.4MB/s), 10.9MiB/s-10.9MiB/s (11.4MB/s-11.4MB/s), io=1024MiB (1074MB), run=94108-94108msec
iodepth=32 WRITE: bw=10.9MiB/s (11.5MB/s), 10.9MiB/s-10.9MiB/s (11.5MB/s-11.5MB/s), io=1024MiB (1074MB), run=93648-93648msec

IOdepth testing (Used Random Read Command)

iodepth=1 READ: bw=15.6MiB/s (16.4MB/s), 15.6MiB/s-15.6MiB/s (16.4MB/s-16.4MB/s), io=1024MiB (1074MB), run=65604-65604msec
iodepth=2 READ: bw=29.8MiB/s (31.3MB/s), 29.8MiB/s-29.8MiB/s (31.3MB/s-31.3MB/s), io=1024MiB (1074MB), run=34316-34316msec
iodepth=4 READ: bw=61.4MiB/s (64.4MB/s), 61.4MiB/s-61.4MiB/s (64.4MB/s-64.4MB/s), io=1024MiB (1074MB), run=16681-16681msec
iodepth=8 READ: bw=116MiB/s (122MB/s), 116MiB/s-116MiB/s (122MB/s-122MB/s), io=1024MiB (1074MB), run=8819-8819msec
iodepth=16 READ: bw=185MiB/s (194MB/s), 185MiB/s-185MiB/s (194MB/s-194MB/s), io=1024MiB (1074MB), run=5548-5548msec
READ: bw=236MiB/s (248MB/s), 236MiB/s-236MiB/s (248MB/s-248MB/s), io=1024MiB (1074MB), run=4336-4336msec

PCC

fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=1g --ioengine=libaio --fsync=1 --direct=1 --numjobs=1

Random Read with O_DIRECT: bw=50.4MiB/s (52.8MB/s), 50.4MiB/s-50.4MiB/s (52.8MB/s-52.8MB/s), io=1024MiB (1074MB), run=20336-20336msec

fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=1g --ioengine=libaio --fsync=1 --direct=1 --numjobs=1

Random Write with O_DIRECT: bw=42.1MiB/s (44.1MB/s), 42.1MiB/s-42.1MiB/s (44.1MB/s-44.1MB/s), io=1024MiB (1074MB), run=24322-24322msec

fio --name TEST --filename=/mnt/lustre/testing --rw=read --size=1g --ioengine=libaio --fsync=10000 --direct=1 --numjobs=1

Sequential Read with O_DIRECT: bw=51.7MiB/s (54.2MB/s), 51.7MiB/s-51.7MiB/s (54.2MB/s-54.2MB/s), io=1024MiB (1074MB), run=19814-19814msec

fio --name TEST --filename=/mnt/lustre/testing --rw=write --size=1g --ioengine=libaio --fsync=10000 --direct=1 --numjobs=1

Sequential Write with O_DIRECT: bw=225MiB/s (236MB/s), 225MiB/s-225MiB/s (236MB/s-236MB/s), io=1024MiB (1074MB), run=4547-4547msec

IOdepth testing (Used Random Write Command)

```
iodepth=1 WRITE: bw=44.5MiB/s (46.7MB/s), 44.5MiB/s-44.5MiB/s (46.7MB/s-46.7MB/s), io=1024MiB (1074MB), run=22991-22991msec
iodepth=2 WRITE: bw=55.4MiB/s (58.1MB/s), 55.4MiB/s-55.4MiB/s (58.1MB/s-58.1MB/s), io=1024MiB (1074MB), run=18471-18471msec
iodepth=4 WRITE: bw=55.5MiB/s (58.2MB/s), 55.5MiB/s-55.5MiB/s (58.2MB/s-58.2MB/s), io=1024MiB (1074MB), run=18444-18444msec
iodepth=8 WRITE: bw=56.1MiB/s (58.8MB/s), 56.1MiB/s-56.1MiB/s (58.8MB/s-58.8MB/s), io=1024MiB (1074MB), run=18259-18259msec
iodepth=16 WRITE: bw=55.5MiB/s (58.2MB/s), 55.5MiB/s-55.5MiB/s (58.2MB/s-58.2MB/s), io=1024MiB (1074MB), run=18447-18447msec
iodepth=32 WRITE: bw=54.8MiB/s (57.4MB/s), 54.8MiB/s-54.8MiB/s (57.4MB/s-57.4MB/s), io=1024MiB (1074MB), run=18693-18693msec
```

IOdepth testing (Used Random Read Command)

```
iodepth=1 READ: bw=55.2MiB/s (57.8MB/s), 55.2MiB/s-55.2MiB/s (57.8MB/s-57.8MB/s), io=1024MiB (1074MB), run=18565-18565msec
iodepth=2 READ: bw=108MiB/s (113MB/s), 108MiB/s-108MiB/s (113MB/s-113MB/s), io=1024MiB (1074MB), run=9470-9470msec
iodepth=4 READ: bw=183MiB/s (192MB/s), 183MiB/s-183MiB/s (192MB/s-192MB/s), io=1024MiB (1074MB), run=5586-5586msec
iodepth=8 READ: bw=319MiB/s (335MB/s), 319MiB/s-319MiB/s (335MB/s-335MB/s), io=1024MiB (1074MB), run=3207-3207mse
iodepth=16 READ: bw=536MiB/s (562MB/s), 536MiB/s-536MiB/s (562MB/s-562MB/s), io=1024MiB (1074MB), run=1912-1912msec
iodepth=32 READ: bw=737MiB/s (773MB/s), 737MiB/s-737MiB/s (773MB/s-773MB/s), io=1024MiB (1074MB), run=1389-1389msec
```

IOR Benchmarks Single Client

Non-PCC

32G Block Size:

```
/usr/lib64/openmpi/bin/mpirun --allow-run-as-root -n 8 /usr/local/bin/ior -v -t 1m -b 32g -o /mnt/lustre/test.
`date +"%Y%m%d.%H%M%S"` -F -C -e

Max Write: 492.30 MiB/sec (516.22 MB/sec)
Max Read:  834.19 MiB/sec (874.71 MB/sec)
```

16G Block Size:

```
/usr/lib64/openmpi/bin/mpirun --allow-run-as-root -n 16 /usr/local/bin/ior -v -t 1m -b 16g -o /mnt/lustre/test.
`date +"%Y%m%d.%H%M%S"` -F -C -e

Max Write: 492.63 MiB/sec (516.56 MB/sec)
Max Read:  834.40 MiB/sec (874.94 MB/sec)
```

1 Big File:

```
/usr/lib64/openmpi/bin/mpirun --allow-run-as-root -n 1 /usr/local/bin/ior -v -t 1m -b 256g -o /mnt/lustre/test.
`date +"%Y%m%d.%H%M%S"` -F -C -e

Max Write: 493.29 MiB/sec (517.25 MB/sec)
Max Read:  834.32 MiB/sec (874.85 MB/sec)
```

PCC

32G Block Size:

```
/usr/lib64/openmpi/bin/mpirun --allow-run-as-root -n 8 /usr/local/bin/ior -v -t 1m -b 32g -o /mnt/lustre/test.
`date +"%Y%m%d.%H%M%S"` -F -C -e

Max Write: 2347.13 MiB/sec (2461.14 MB/sec)
Max Read:  4863.73 MiB/sec (5099.99 MB/sec)
```

16G Block Size:

```
/usr/lib64/openmpi/bin/mpirun --allow-run-as-root -n 16 /usr/local/bin/ior -v -t 1m -b 16g -o /mnt/lustre/test.
`date +"%Y%m%d.%H%M%S"` -F -C -e

Max Write: 2363.14 MiB/sec (2477.93 MB/sec)
Max Read:  5350.04 MiB/sec (5609.92 MB/sec)
```

1 Big File:

```
/usr/lib64/openmpi/bin/mpirun --allow-run-as-root -n 1 /usr/local/bin/ior -v -t 1m -b 256g -o /mnt/lustre/test.
`date +"%Y%m%d.%H%M%S"` -F -C -e

Max Write: 1019.39 MiB/sec (1068.91 MB/sec)
Max Read:  2386.48 MiB/sec (2502.41 MB/sec)
```

IOR Benchmark 2 Clients

Non-PCC

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F
```

Max Write: 490.13 MiB/sec (513.94 MB/sec)
Max Read: 825.21 MiB/sec (865.30 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F -C -e
```

Max Write: 487.10 MiB/sec (510.76 MB/sec)
Max Read: 828.59 MiB/sec (868.84 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F -C
```

Max Write: 489.72 MiB/sec (513.51 MB/sec)
Max Read: 822.64 MiB/sec (862.60 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F -e
```

Max Write: 485.23 MiB/sec (508.81 MB/sec)
Max Read: 835.58 MiB/sec (876.17 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1
```

Max Write: 362.58 MiB/sec (380.20 MB/sec)
Max Read: 835.82 MiB/sec (876.42 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1 -C -e
```

Max Write: 362.61 MiB/sec (380.23 MB/sec)
Max Read: 836.50 MiB/sec (877.13 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1 -C
```

Max Write: 361.28 MiB/sec (378.83 MB/sec)
Max Read: 836.31 MiB/sec (876.93 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -t 1m -
b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1 -e
```

Max Write: 361.52 MiB/sec (379.09 MB/sec)
Max Read: 835.84 MiB/sec (876.45 MB/sec)

PCC

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"`
```

Max Write: 5313.08 MiB/sec (5571.17 MB/sec)
Max Read: 6089.41 MiB/sec (6385.21 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -C -e
```

Max Write: 4577.93 MiB/sec (4800.31 MB/sec)
Max Read: 282.92 MiB/sec (296.67 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -C
```

Max Write: 5357.95 MiB/sec (5618.21 MB/sec)
Max Read: 283.12 MiB/sec (296.87 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -e
```

Max Write: 4566.08 MiB/sec (4787.88 MB/sec)
Max Read: 8261.93 MiB/sec (8663.27 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` --posix.odirect=1
```

Max Write: 4739.23 MiB/sec (4969.45 MB/sec)

Max Read: 11244.14 MiB/sec (11790.33 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` --posix.odirect=1 -C -e
```

Max Write: 4666.27 MiB/sec (4892.94 MB/sec)

Max Read: 291.88 MiB/sec (306.05 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` --posix.odirect=1 -C
```

Max Write: 4643.41 MiB/sec (4868.97 MB/sec)

Max Read: 286.45 MiB/sec (300.36 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4 -np 8 --allow-run-as-root --map-by slot /usr/local/bin/ior -v -F -t
1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` --posix.odirect=1 -e
```

Max Write: 4705.59 MiB/sec (4934.17 MB/sec)

Max Read: 11141.89 MiB/sec (11683.12 MB/sec)

IOR Benchmark 3 Clients

Non-PCC

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F
```

Max Write: 487.53 MiB/sec (511.22 MB/sec)
Max Read: 831.36 MiB/sec (871.74 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F -C -e
```

Max Write: 486.44 MiB/sec (510.07 MB/sec)
Max Read: 829.60 MiB/sec (869.90 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F -C
```

Max Write: 486.80 MiB/sec (510.44 MB/sec)
Max Read: 829.01 MiB/sec (869.28 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F -e
```

Max Write: 486.12 MiB/sec (509.73 MB/sec)
Max Read: 835.55 MiB/sec (876.13 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1
```

Max Write: 377.43 MiB/sec (395.77 MB/sec)
Max Read: 835.38 MiB/sec (875.95 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1 -C -e
```

Max Write: 377.83 MiB/sec (396.19 MB/sec)
Max Read: 834.75 MiB/sec (875.30 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1 -C
```

Max Write: 374.59 MiB/sec (392.79 MB/sec)
Max Read: 835.32 MiB/sec (875.89 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1 -e
```

Max Write: 385.55 MiB/sec (404.28 MB/sec)
Max Read: 835.75 MiB/sec (876.35 MB/sec)

PCC

Note: The below test didn't report any I/O being performed on mawenzi01. Also the `-C` option seems to be failing with 3 clients and PCC

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F
```

Max Write: 7962.42 MiB/sec (8349.20 MB/sec)
Max Read: 9187.60 MiB/sec (9633.90 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F -e
```

Max Write: 6926.82 MiB/sec (7263.30 MB/sec)
Max Read: 12095.03 MiB/sec (12682.56 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1
```

Max Write: 7077.40 MiB/sec (7421.19 MB/sec)
Max Read: 16346.31 MiB/sec (17140.35 MB/sec)

```
/usr/lib64/openmpi/bin/mpirun -H m05:4,m07:4,m06:4 -np 12 --allow-run-as-root --map-by slot /usr/local/bin/ior -v
-t 1m -b 64g -o /mnt/lustre/test.`date +"%Y%m%d.%H%M%S"` -F --posix.odirect=1 -e
```

Max Write: 6954.95 MiB/sec (7292.80 MB/sec)
Max Read: 15728.51 MiB/sec (16492.54 MB/sec)