Docker node IO test at TRIUMF

Sep. 26 2016, by Xinli(Simon) Liu

Test environment:

We used two work nodes for this testing. One is from IBM chassis, the other is from SUN chassis, not meant to compare them, but to have two sets of testing beds.

wn393(node from IBM chassis):

```
Hardware: 2 sockets, 6 cores/socket, HT disabled, 48GB memory, 2*10k SAS drives,
LVM RAID0.
OS: SL7.2, 3.10.0-327.28.3.el7.x86_64
Docker Source RPM  : docker-1.10.3-44.el7.centos.src.rpm
```

wn242(node from SUN chassis):

```
Hardware: 2 sockets, 4 cores/socket, HT disabled, 24GB memory, 2*10k SAS drives,
LVM RAID0.
OS: SL7.2, 3.10.0-327.28.3.el7.x86_64
Docker Source RPM  : docker-1.10.3-44.el7.centos.src.rpm
```

Test method:

Use iozone to test RAID0 /home area, ext4 file system. Sequential IO only.
To eliminate impact of memory buffer and test file physical location on disk, the very large test file were used.
Both LVM and ext4 use default settings. Different readahead buffer applied to the tests: 256,512,1024,2048,4096,8192 blockdev factor were used.
Here is one of test iozone command example:

```
/usr/bin/iozone -s256g -i 0 -i 1 -t 1 -j 2 -+u -R
```

Iozone test numbers and charts

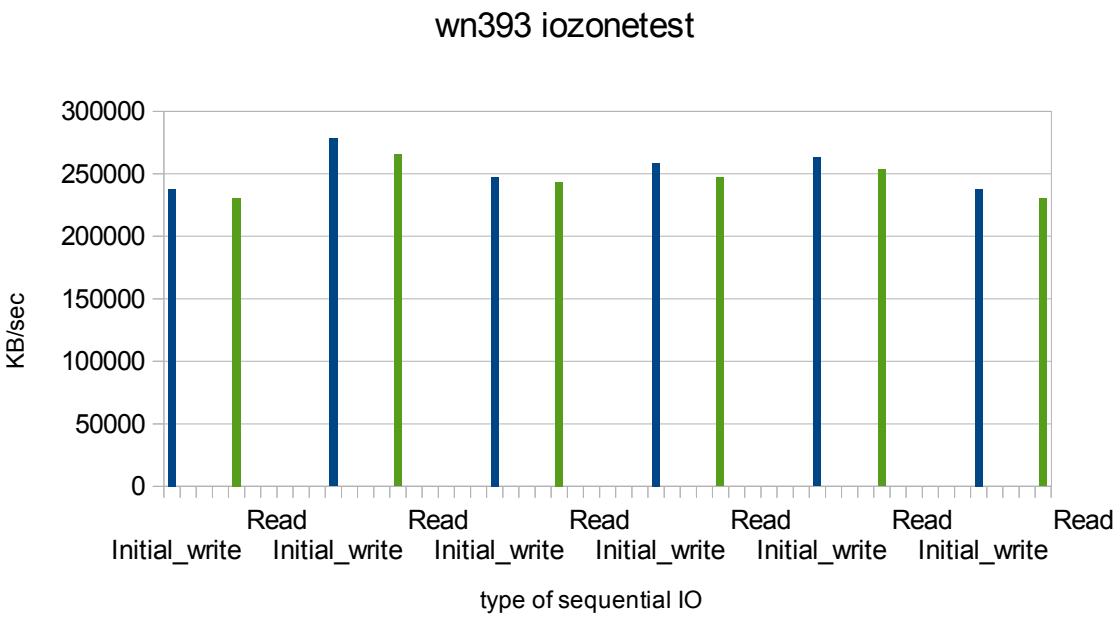
Here is a table matrix shows detail numbers when ra set to 2048. The following 4 pages show testing results in charts, with different readahead setting(256,512,1024,2048,4196,8192)
wn393:

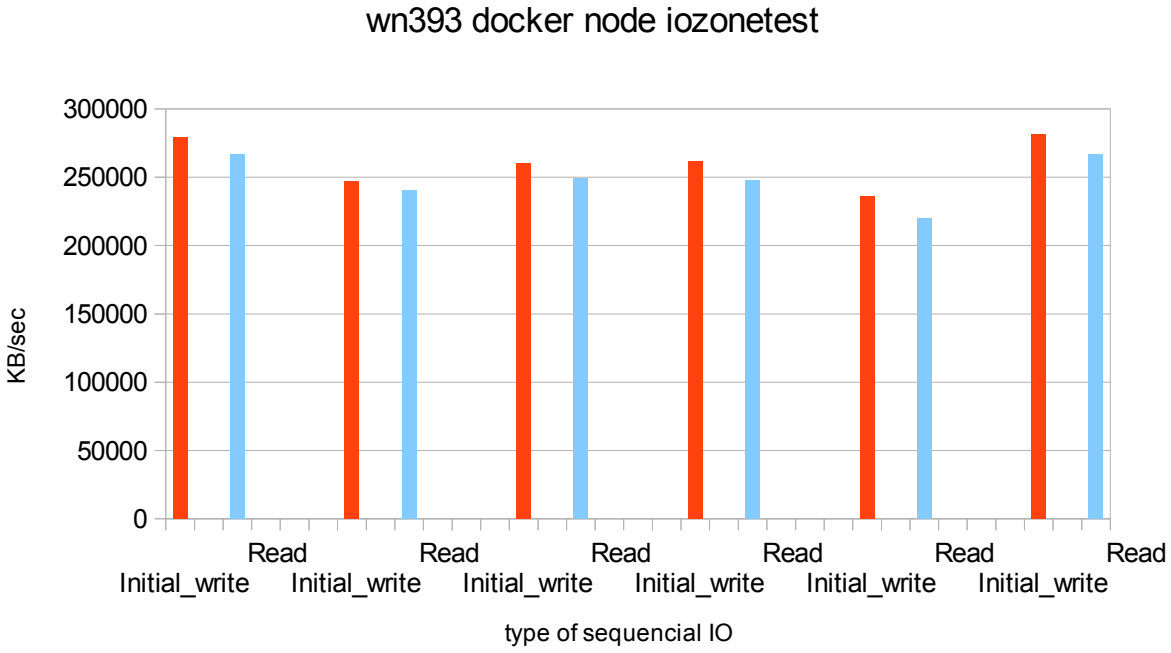
Readahead 2048	Wn393	Docker node on wn393
Writing	258722.62	261641.78
Writing CPU utilization	27.8	30.97
Reading	243319.17	247967.12
Reading CPU utilization	10.68	12.20

Wn242:

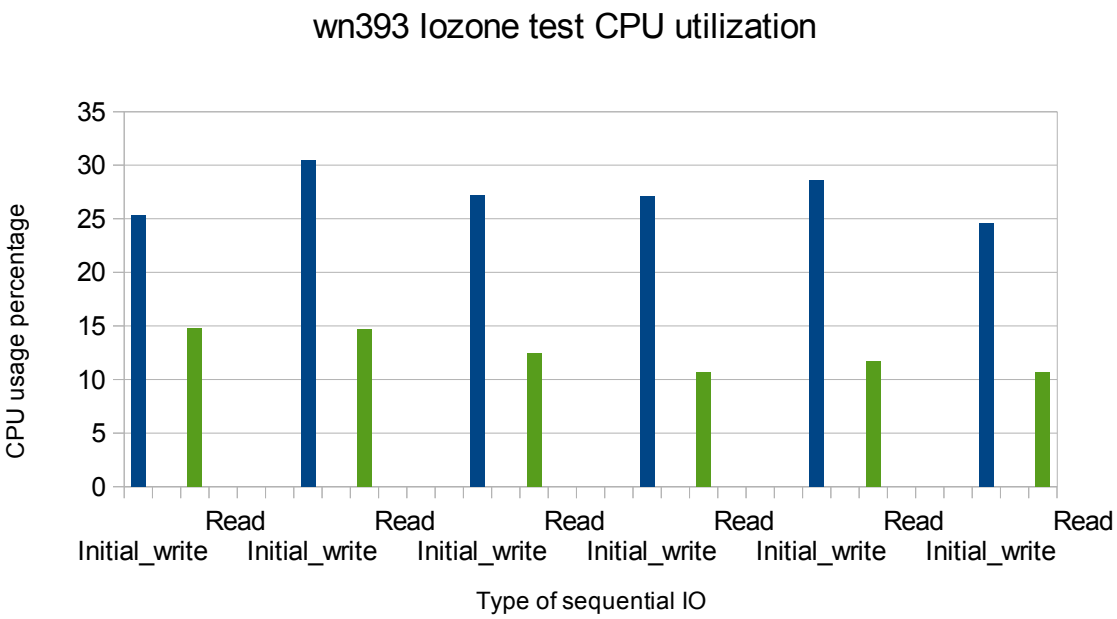
Readahead 2048	Wn242	Docker node on wn242
Writing	210629.66	212344.78
Writing CPU utilization	22.31	24.54
Reading	211930.06	211296.72
Reading CPU utilization	9.78	10.96

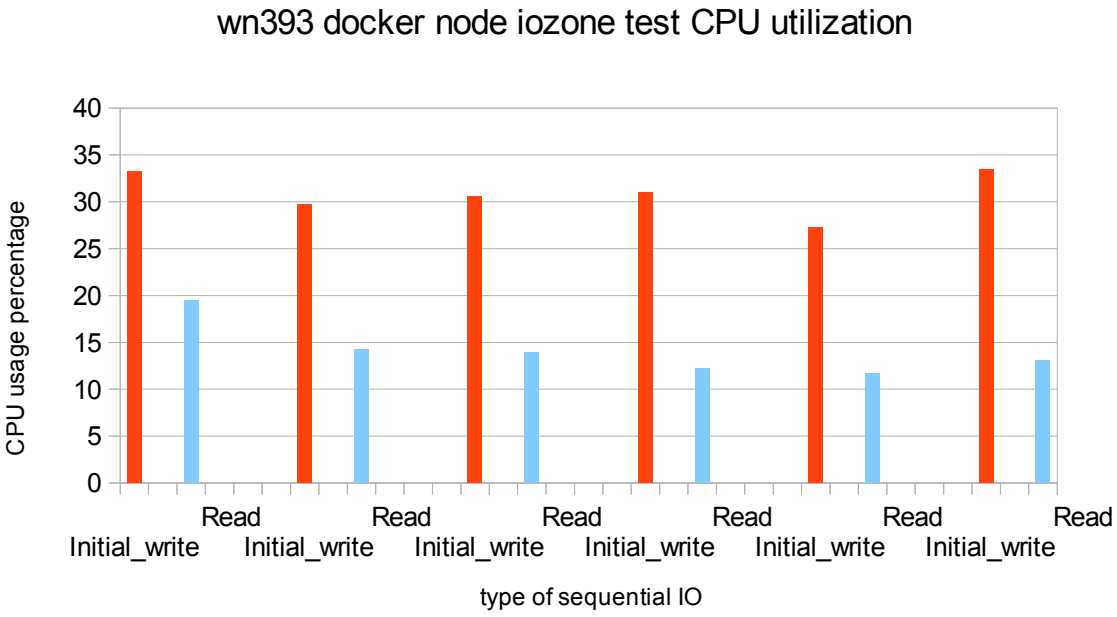
wn393 vs wn393 docker nodes iozone test



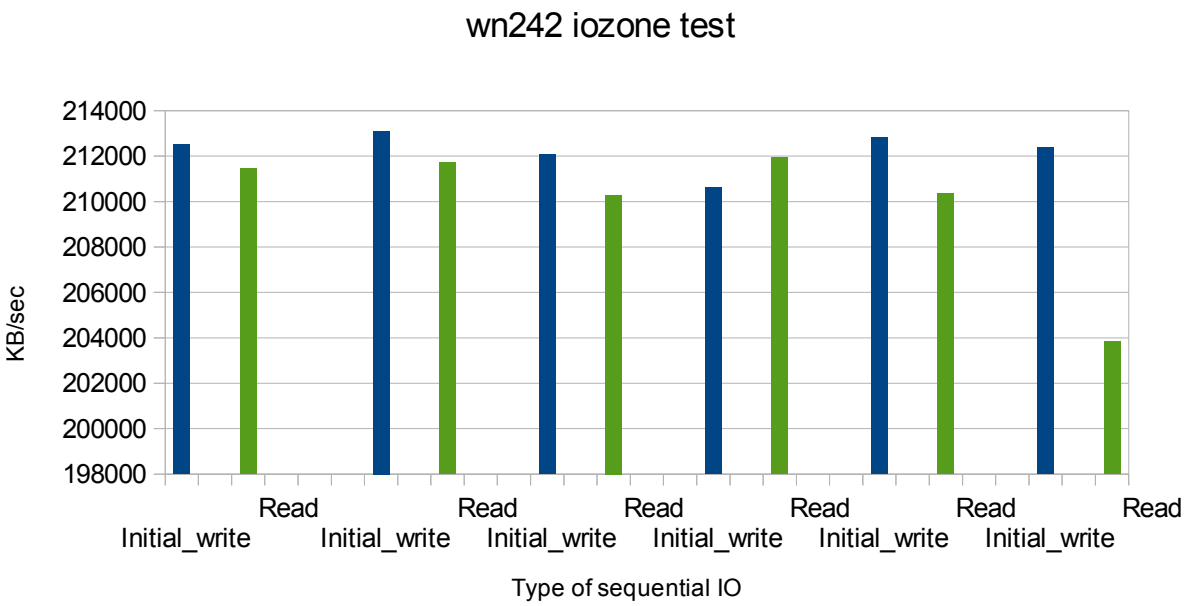


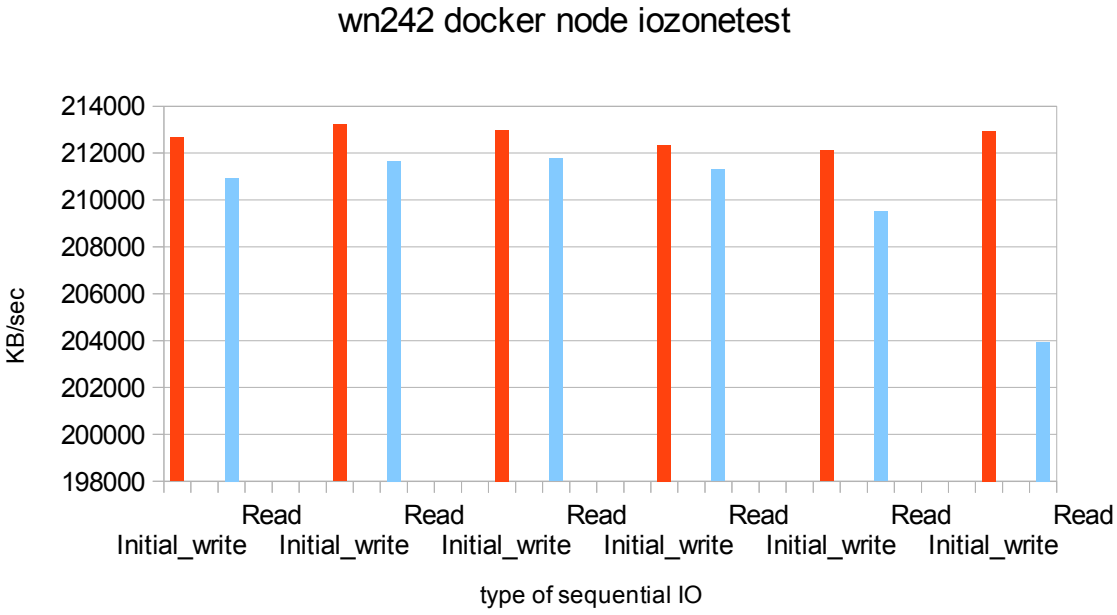
wn393 vs wn393 docker nodes iozonetest CPU utilization



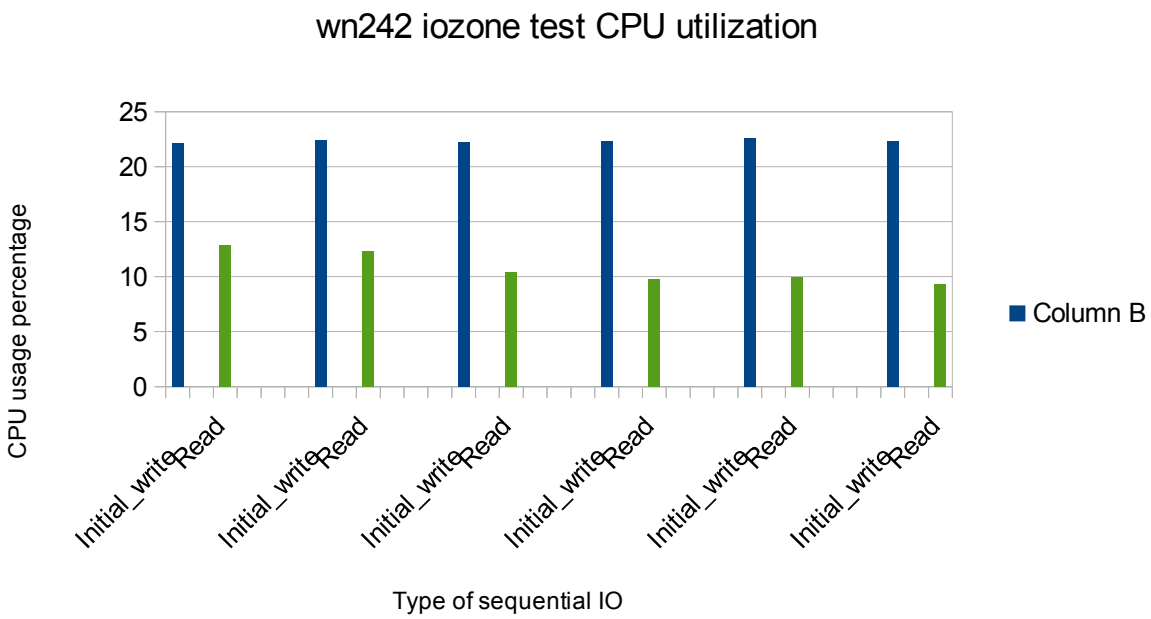


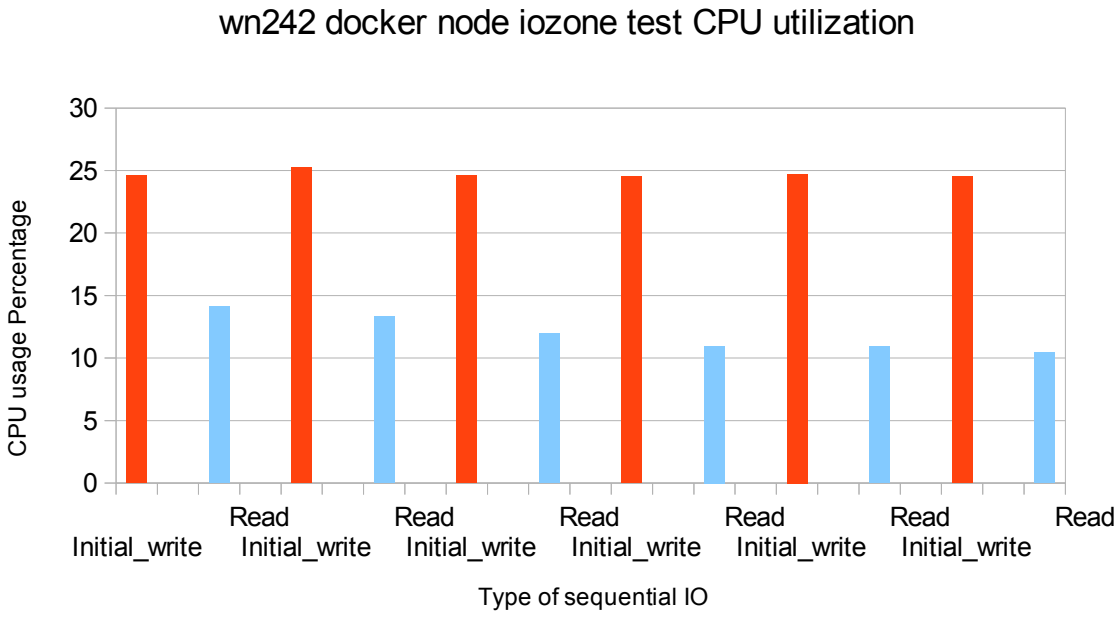
wn242 vs wn242 docker nodes iozone test





wn242 vs wn242 docker node iozone test CPU utilization





Quick summary

1. docker nodes io testing shows they are as nearly same as their host server

2. docker nodes io add some extra CPU overhead(10 to 20% more CPU utilization)

3. With proper io readahead buffer setting, both local and docker nodes can reduce CPU utilization up to 50% on reading. nearly nothing on writing.

4. with ra setting, both localhost and docker node have both i/o penalty, 10-20%.