1 测试方案概述
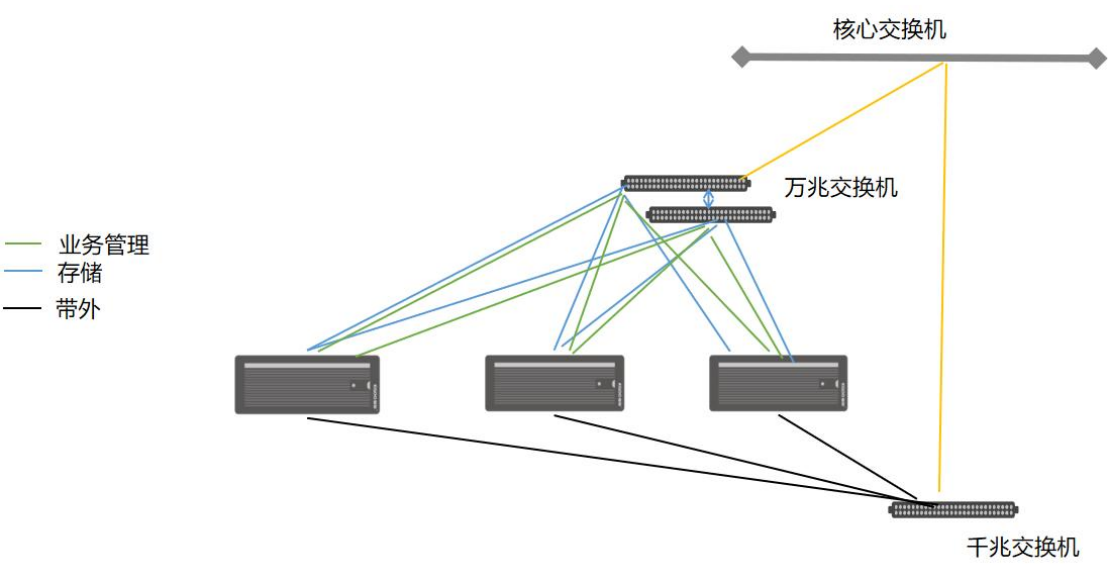
1.1 测试目的

本测试方案是深圳市杉岩数据技术有限公司（以下简称：杉岩）针对合肥中科类脑智能技术有限公司的生产系统的实际存储业务需求，对杉岩分布式存储包括了性能、可靠性等方面。

1.2 测试拓扑图

1.3 硬件设备配置

类别	配置项	规格
存储节点硬件配置	设备类型	型号 SC6300
	CPU 配置	2*Intel XEON Silver 4216 Processor 16C/32T 2.10GHz 22MB
	内存配置	8*32GB/DDR4/2666MHz 或 2933MHz 或 3200MHz/ECC/REG
	硬盘配置	系统盘：2*240GB/SATA SSD 6Gb/2.5 寸/企业级 数据盘：3*960GB/SATA SSD 6Gb/2.5 寸/企业级；2*2TB/NVME SSD U.2 接口/2.5 寸/企业级；24*16TB/SATA/7200RPM/3.5 寸/企业级
	网络适配器	1*双口千兆网卡；2*双口万兆网卡（含 SFP+模块）

RAID 卡	1*支持直通和 RAID 0/1	
数量	3	
备注		

1.4 测试软件信息

名称	类别	版本信息
Usp	统一存储	V5.6.1P001

1.5 存储环境信息

存储管理系统登录地址：

http://10.10.0.101:6680

管理系统账号密码：

admin/admin

2 性能测试

测试工具： CosBench

2.1并发读写性能测试

用例名称	并发读写性能测试	
测试目的	验证存储系统的并发读写性能	
预置条件	1）搭建环境完成，处于正常运行状态； 2）操作人员拥有存储系统管理员操作权限。	
测试过程		预期结果
1） 创建 2 存储策略存储池 2） 创建 test1-test3 共共 3 个测试桶 3） 模拟平均大小分别为		

	4k,16k,32k,64k,128k,256k,512k,1M 的文件读写，采用多并发线程读写（具体根据服务器配置设置）； 4）记录吞吐量 GB/S	

测试结果	对象大小	读写模型	带宽(MB/s)	时延(ms)	ops	成功率
4K	写	62.89	19.02	15721	100%
	读	131.46	9.12	32865	100%
16K	写	222.82	21.37	13925	100%
	读	518.46	9.19	32404	100%
32k	写	301.54	31.58	9423	100%
	读	1044	9.32	31892	100%
64K	写	477.23	39.81	7456	100%
	读	2017.28	9.58	30813	100%
128K	写	728.97	50.78	5695	100%
	读	1551.33	24.32	12119	100%
256K	写	980.32	74.71	3829	100%
	读	2140.12	34.98	8369	100%
512K	写	901.87	77.50	1761	100%
	读	2280	31.82	4454	100%
1M	写	4157.44	67.06	4058	100%
	读	7301.12	40.25	7117	100%

备注

4k

General Report

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	307.2 kops	1.23 GB	19.02 ms	19.02 ms	15721.49 op/s	62.89 MB/S	100%
op1: prepare - write	102.4 kops	409.6 MB	15.74 ms	15.74 ms	6326.03 op/s	25.3 MB/S	100%
op2: prepare - write	102.4 kops	409.6 MB	15.3 ms	15.3 ms	6509.63 op/s	26.04 MB/S	100%
op3: prepare - write	102.4 kops	409.6 MB	14.86 ms	14.86 ms	6698.63 op/s	26.79 MB/S	100%
op1: read	985.78 kops	3.94 GB	9.12 ms	9.12 ms	32865.27 op/s	131.46 MB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time	End Time	Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w53-s1-write4K	write4K	3 wks	300 wkrs	write	completed	view details
w53-s2-prepare4K	prepare4K	3 wks	300 wkrs	prepare	completed	view details
w53-s3-read4K	read4K	3 wks	300 wkrs	read	completed	view details

There are 3 stages in this workload.

16k

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	307.2 kops	4.92 GB	21.48 ms	21.37 ms	13925.95 op/s	222.82 MB/S	100%
op1: prepare - write	102.4 kops	1.64 GB	21.43 ms	21.34 ms	4652.91 op/s	74.45 MB/S	100%
op2: prepare - write	102.4 kops	1.64 GB	21.4 ms	21.3 ms	4659.67 op/s	74.55 MB/S	100%
op3: prepare - write	102.4 kops	1.64 GB	21.11 ms	21 ms	4723.27 op/s	75.57 MB/S	100%
op1: read	971.95 kops	15.55 GB	9.25 ms	9.19 ms	32404.03 op/s	518.46 MB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time	End Time	Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w55-s1-write16K	write16K	3 wks	300 wkrs	write	completed	view details
w55-s2-prepare16K	prepare16K	3 wks	300 wkrs	prepare	completed	view details
w55-s3-read16K	read16K	3 wks	300 wkrs	read	completed	view details

32k

General Report

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	307.2 kops	9.83 GB	31.77 ms	31.58 ms	9423.21 op/s	301.54 MB/S	100%
op1: prepare - write	102.4 kops	3.28 GB	26.46 ms	26.27 ms	3771.22 op/s	120.68 MB/S	100%
op2: prepare - write	102.4 kops	3.28 GB	26.58 ms	26.38 ms	3753.98 op/s	120.13 MB/S	100%
op3: prepare - write	102.4 kops	3.28 GB	26.29 ms	26.09 ms	3794.92 op/s	121.44 MB/S	100%
op1: read	956.59 kops	30.61 GB	9.4 ms	9.32 ms	31892.05 op/s	1.02 GB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time	End Time	Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w56-s1-write32K	write32K	3 wks	300 wkrs	write	completed	view details
w56-s2-prepare32K	prepare32K	3 wks	300 wkrs	prepare	completed	view details
w56-s3-read32K	read32K	3 wks	300 wkrs	read	completed	view details

64k

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	307.2 kops	19.66 GB	40.17 ms	39.81 ms	7456.68 op/s	477.23 MB/S	100%
op1: prepare - write	102.4 kops	6.55 GB	37.72 ms	37.35 ms	2647.02 op/s	169.41 MB/S	100%
op2: prepare - write	102.4 kops	6.55 GB	37.91 ms	37.54 ms	2633.27 op/s	168.53 MB/S	100%
op3: prepare - write	102.4 kops	6.55 GB	38.46 ms	38.09 ms	2596.28 op/s	166.16 MB/S	100%
op1: read	924.25 kops	59.15 GB	9.73 ms	9.58 ms	30813.97 op/s	1.97 GB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time	End Time	Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w57-s1-write64K	write64K	3 wks	300 wkrs	write	completed	view details
w57-s2-prepare64K	prepare64K	3 wks	300 wkrs	prepare	completed	view details
w57-s3-read64K	read64K	3 wks	300 wkrs	read	completed	view details

128k

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	102.4 kops	13.11 GB	52.74 ms	51.07 ms	1890.78 op/s	242.02 MB/S	100%
op2: write	102.4 kops	13.11 GB	52.46 ms	50.65 ms	1900.84 op/s	243.31 MB/S	100%
op3: write	102.4 kops	13.11 GB	52.39 ms	50.62 ms	1903.43 op/s	243.64 MB/S	100%
op1: prepare - write	102.4 kops	13.11 GB	55 ms	53.34 ms	1813.57 op/s	232.14 MB/S	100%
op2: prepare - write	102.4 kops	13.11 GB	55.18 ms	53.31 ms	1806.97 op/s	231.29 MB/S	100%
op3: prepare - write	102.4 kops	13.11 GB	54.97 ms	53.17 ms	1814.09 op/s	232.21 MB/S	100%
op1: read	128.64 kops	16.47 GB	23.3 ms	22.84 ms	4290.11 op/s	549.13 MB/S	100%
op2: read	121.59 kops	15.56 GB	24.65 ms	24.17 ms	4054.87 op/s	519.02 MB/S	100%
op3: read	113.19 kops	14.49 GB	26.48 ms	25.95 ms	3774.83 op/s	483.18 MB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time	End Time	Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w18-s1-write128K	write128K	3 wks	300 wkrs	write	completed	view details
w18-s2-prepare128K	prepare128K	3 wks	300 wkrs	prepare	completed	view details
w18-s3-read128K	read128K	3 wks	300 wkrs	read	completed	view details

256k

General Report

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	102.4 kops	26.21 GB	78.35 ms	75.17 ms	1273.95 op/s	326.13 MB/S	100%
op2: write	102.4 kops	26.21 GB	78.3 ms	74.62 ms	1274.26 op/s	326.21 MB/S	100%
op3: write	102.4 kops	26.21 GB	77.89 ms	74.35 ms	1281.16 op/s	327.98 MB/S	100%
op1: prepare - write	102.4 kops	26.21 GB	78.02 ms	74.66 ms	1279.35 op/s	327.51 MB/S	100%
op2: prepare - write	102.4 kops	26.21 GB	77.77 ms	74.1 ms	1283.45 op/s	328.56 MB/S	100%
op3: prepare - write	102.4 kops	26.21 GB	77.32 ms	73.71 ms	1290.79 op/s	330.44 MB/S	100%
op1: read	78.18 kops	20.01 GB	38.34 ms	37.36 ms	2607.67 op/s	667.56 MB/S	100%
op2: read	82.98 kops	21.24 GB	36.11 ms	35.1 ms	2768.16 op/s	708.65 MB/S	100%
op3: read	89.44 kops	22.9 GB	33.49 ms	32.48 ms	2984.03 op/s	763.91 MB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time	End Time	Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w19-s1-write256K	write256K	3 wks	300 wkrs	write	completed	view details
w19-s2-prepare256K	prepare256K	3 wks	300 wkrs	prepare	completed	view details
w19-s3-read256K	read256K	3 wks	300 wkrs	read	completed	view details

512k

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	10.2 kops	5.22 GB	84.38 ms	77.4 ms	591.84 op/s	303.02 MB/S	100%
op2: write	10.2 kops	5.22 GB	85.44 ms	77.62 ms	583.98 op/s	299 MB/S	100%
op3: write	10.2 kops	5.22 GB	85.21 ms	77.49 ms	585.64 op/s	299.85 MB/S	100%
op1: prepare - write	10.24 kops	5.24 GB	110.63 ms	102.64 ms	454.6 op/s	232.75 MB/S	100%
op2: prepare - write	10.24 kops	5.24 GB	108.22 ms	99.93 ms	464.55 op/s	237.85 MB/S	100%
op3: prepare - write	10.24 kops	5.24 GB	108.12 ms	99.83 ms	464.87 op/s	238.01 MB/S	100%
op1: read	44.74 kops	22.91 GB	33.48 ms	31.72 ms	1492.89 op/s	764.36 MB/S	100%
op2: read	44.38 kops	22.73 GB	33.75 ms	31.91 ms	1480.64 op/s	758.09 MB/S	100%
op3: read	44.37 kops	22.72 GB	33.74 ms	31.83 ms	1481.09 op/s	758.32 MB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time	End Time	Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w21-s1-write512K	write512K	3 wks	150 wkrs	write	completed	view details
w21-s2-prepare512K	prepare512K	3 wks	150 wkrs	prepare	completed	view details
w21-s3-read512K	read512K	3 wks	150 wkrs	read	completed	view details
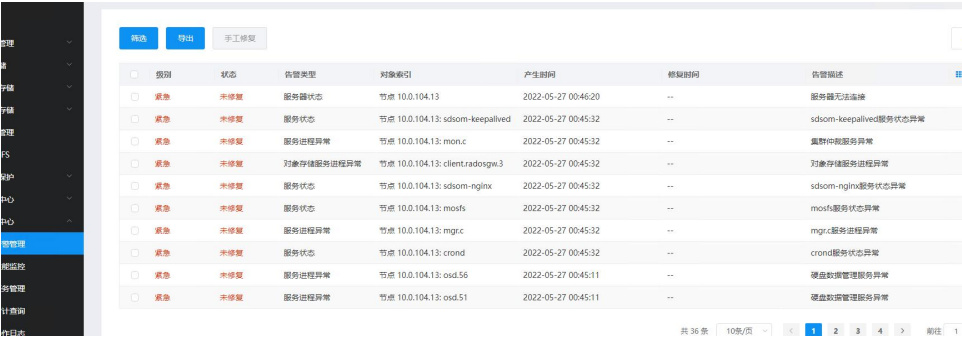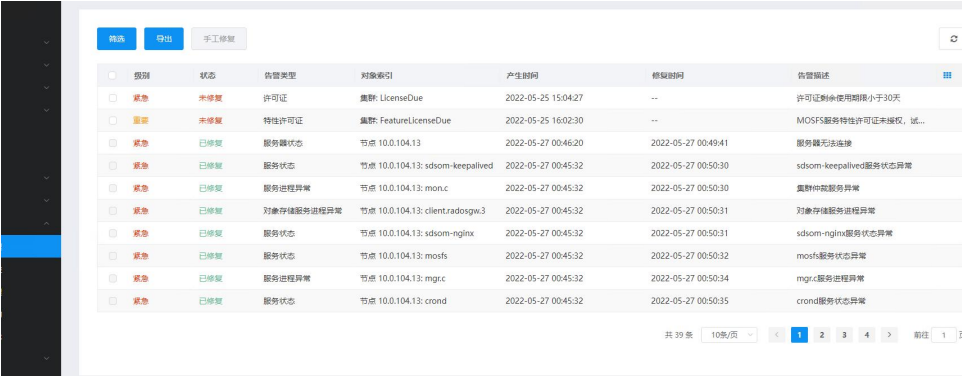
1M

Final Result

General Report

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	20.4 kops	20.4 GB	72.21 ms	65.61 ms	1385.17 op/s	1.39 GB/S	100%
op2: write	20.4 kops	20.4 GB	72.31 ms	65.7 ms	1382.67 op/s	1.38 GB/S	100%
op3: write	20.4 kops	20.4 GB	77.09 ms	69.88 ms	1290.69 op/s	1.29 GB/S	100%
op1: prepare - write	20.48 kops	20.48 GB	71.27 ms	64.77 ms	1402.84 op/s	1.4 GB/S	100%
op2: prepare - write	20.48 kops	20.48 GB	71.49 ms	64.73 ms	1398.28 op/s	1.4 GB/S	100%
op3: prepare - write	20.48 kops	20.48 GB	72.54 ms	65.95 ms	1377.35 op/s	1.38 GB/S	100%
op1: read	75.09 kops	75.09 GB	39.91 ms	37.83 ms	2505.18 op/s	2.51 GB/S	100%
op2: read	62.16 kops	62.16 GB	48.16 ms	45.83 ms	2075.87 op/s	2.08 GB/S	100%
op3: read	76 kops	76 GB	39.42 ms	37.1 ms	2536.22 op/s	2.54 GB/S	100%

show peformance details

Stages

Current Stage	Stages completed	Stages remaining	Start Time		End Time		Time Remaining

ID	Name	Works	Workers	Op-Info	State	Link
w10-s1-write1M	write1M	3 wks	300 wkrs	write	completed	view details
w10-s2-prepare1M	prepare1M	3 wks	300 wkrs	prepare	completed	view details
w10-s3-read1M	read1M	3 wks	300 wkrs	read	completed	view details

There are 3 stages in this workload

3 可靠性测试

3.1 单存储服务器故障

用例名称	单存储服务器故障	
测试目的	验证存储系统单服务器故障后的业务影响	
预置条件	1）系统环境搭建完成，处于正常运行状态 2）已获取管理系统的操作权限。	
测试过程		预期结果
1）使用管理员账号登陆存储管理系统，查看当前存储池状态； 2）将任意一台服务器强制下电； 3）在管理系统，查看磁盘状态和告警； 4）重新启动服务器。		1）登录成功； 2）连接成功，文件上传成功； 3）几分钟后，可以在管理系统上看到服务器状态异常； 4）等待一段时间，观察集群告警恢复，状态恢复正常。
测试结果	通过	

备注	1.reboot 节点
	2.集群能看到节点异常
	3.节点重启相应告警恢复，节点状态恢复

4 测试总结

本次对杉岩分布式存储进行了性能、可靠性、等方面的测试。全部通过测试，综上测试结果分析：

1）杉岩分布式存储2副本策略下在此硬件配置性能测小块4K写的性能达到15721op/s，小块4k读的性能达到32865；大试块1M写带宽为4.06GB/s，大块1M读带宽为7.13GB/s。

2）模拟节点可靠性场景下，测试通过

6 测试结果确认

测试方：	被测试方：
杉岩数据	合肥中科类脑智能技术有限公司
测试人员签名：叶午生	被测试人员签名：