

数据中心实验报告

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实验一 系统搭建

1. 启动minio

```
C:\Windows\system32\cmd.exe

You are running an older version of MinIO released 1 month ago
Update: Run mc admin update

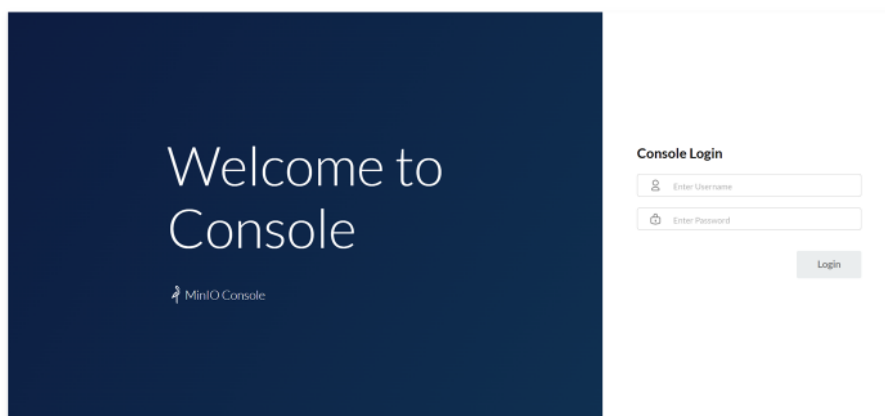
API: http://10.11.68.246:9000 http://192.168.56.1:9000 http://127.0.0.1:9000
RootUser: hust
RootPass: hust_obs

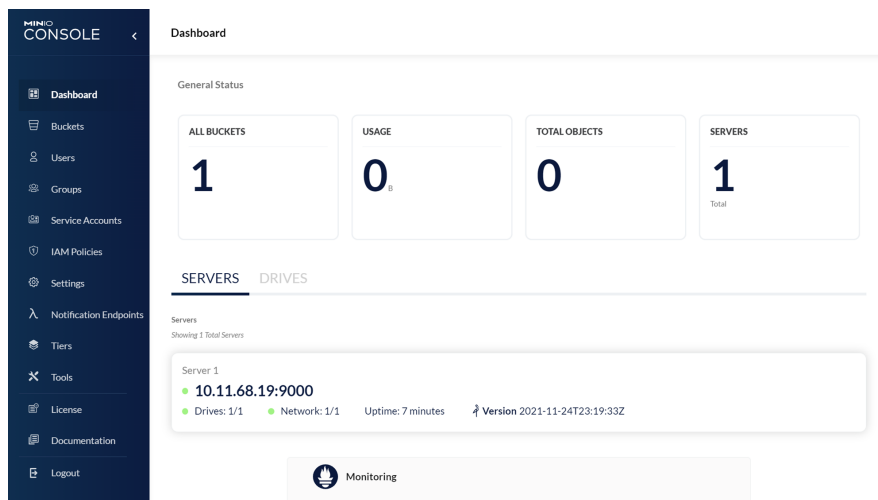
Console: http://10.11.68.246:9090 http://192.168.56.1:9090 http://127.0.0.1:9090
RootUser: hust
RootPass: hust_obs

Command-line: https://docs.min.io/docs/minio-client-quickstart-guide
$ mc.exe alias set myminio http://10.11.68.246:9000 hust hust_obs

Documentation: https://docs.min.io
```

2. 登录网页，创建bucket





实验二 性能观测

指标：吞吐率Throughput，延迟Latency，以及环境参数：对象尺寸、并发性、服务器数量

1. 初始配置

numClients=8、numSamples=256、objectSize=1024

```
E:\华科\课件\数据中心技术\DataCenterLab>e3bench.exe -accessKey=must
e=1024
Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0010 MB
numClients: 8
numSamples: 256
verbose: %d(bool=false)

Generating in-memory sample data... Done (999.64ms)
Running Write test...
Running Read test...

Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0010 MB
numClients: 8
numSamples: 256
verbose: %d(bool=false)

Results Summary for Write Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 0.21 MB/s
Total Duration: 1.188 s
Number of Errors: 0
-----
Write times Max: 0.100 s
Write times 99th %ile: 0.083 s
Write times 90th %ile: 0.063 s
Write times 75th %ile: 0.047 s
Write times 50th %ile: 0.032 s
Write times 25th %ile: 0.024 s
Write times Min: 0.003 s

Results Summary for Read Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 9.11 MB/s
Total Duration: 0.027 s
Number of Errors: 0
-----
Read times Max: 0.003 s
Read times 99th %ile: 0.003 s
Read times 90th %ile: 0.001 s
Read times 75th %ile: 0.001 s
Read times 50th %ile: 0.001 s
Read times 25th %ile: 0.001 s
Read times Min: 0.001 s

Cleaning up 256 objects...
Deleting a batch of 256 objects in range [0, 255]... Succeeded
Successfully deleted 256/256 objects in 95.8041ms
```

修改负载

2. numClients=16、numSamples=256、objectSize=1024

```

E:\华科\课件\数据中心技术\DataCenterLab>s3bench.exe -accessKey=
ze=1024
Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0010 MB
numClients: 16
numSamples: 256
verbose: %!d(bool=false)

Generating in-memory sample data... Done (1.0004ms)

Running Write test...

Running Read test...

Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0010 MB
numClients: 16
numSamples: 256
verbose: %!d(bool=false)

Results Summary for Write Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 0.14 MB/s
Total Duration: 1.725 s
Number of Errors: 0
-----
Write times Max: 0.156 s
Write times 99th %ile: 0.155 s
Write times 90th %ile: 0.137 s
Write times 75th %ile: 0.123 s
Write times 50th %ile: 0.108 s
Write times 25th %ile: 0.093 s
Write times Min: 0.030 s

Results Summary for Read Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 9.64 MB/s
Total Duration: 0.026 s
Number of Errors: 0
-----
Read times Max: 0.004 s
Read times 99th %ile: 0.003 s
Read times 90th %ile: 0.002 s
Read times 75th %ile: 0.002 s
Read times 50th %ile: 0.002 s
Read times 25th %ile: 0.001 s
Read times Min: 0.001 s

Cleaning up 256 objects...
Deleting a batch of 256 objects in range [0, 255]... Succeeded
Successfully deleted 256/256 objects in 94.367ms

```

3. numClients=8、numSamples=512、objectSize=1024


```

E:\华科\课件\数据中心技术\DataCenterLab>s3bench.exe -accessKey=hust
e=1024
Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0010 MB
numClients: 8
numSamples: 512
verbose: %!d(bool=false)

Generating in-memory sample data... Done (1.0002ms)

Running Write test...

Running Read test...

Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0010 MB
numClients: 8
numSamples: 512
verbose: %!d(bool=false)

Results Summary for Write Operation(s)
Total Transferred: 0.500 MB
Total Throughput: 0.18 MB/s
Total Duration: 2.805 s
Number of Errors: 0
-----
Write times Max: 0.100 s
Write times 99th %ile: 0.086 s
Write times 90th %ile: 0.063 s
Write times 75th %ile: 0.061 s
Write times 50th %ile: 0.046 s
Write times 25th %ile: 0.031 s
Write times Min: 0.004 s

Results Summary for Read Operation(s)
Total Transferred: 0.500 MB
Total Throughput: 9.63 MB/s
Total Duration: 0.052 s
Number of Errors: 0
-----
Read times Max: 0.002 s
Read times 99th %ile: 0.002 s
Read times 90th %ile: 0.001 s
Read times 75th %ile: 0.001 s
Read times 50th %ile: 0.001 s
Read times 25th %ile: 0.001 s
Read times Min: 0.000 s

Cleaning up 512 objects...
Deleting a batch of 512 objects in range [0, 511]... Succeeded
Successfully deleted 512/512 objects in 196.5917ms

```

4. numClients=8、numSamples=256、objectSize=2048

```

E:\华科\课件\数据中心技术\DataCenterLab>s3bench.exe -accessKey=h
e=2048
Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0020 MB
numClients: 8
numSamples: 256
verbose: %!d(bool=false)

Generating in-memory sample data... Done (999.84s)

Running Write test...

Running Read test...

Test parameters
endpoint(s): [http://127.0.0.1:9000]
bucket: loadgen
objectNamePrefix: loadgen
objectSize: 0.0020 MB
numClients: 8
numSamples: 256
verbose: %!d(bool=false)

Results Summary for Write Operation(s)
Total Transferred: 0.500 MB
Total Throughput: 0.39 MB/s
Total Duration: 1.291 s
Number of Errors: 0
-----
Write times Max: 0.095 s
Write times 99th %ile: 0.094 s
Write times 90th %ile: 0.064 s
Write times 75th %ile: 0.049 s
Write times 50th %ile: 0.032 s
Write times 25th %ile: 0.029 s
Write times Min: 0.004 s

Results Summary for Read Operation(s)
Total Transferred: 0.500 MB
Total Throughput: 18.59 MB/s
Total Duration: 0.027 s
Number of Errors: 0
-----
Read times Max: 0.002 s
Read times 99th %ile: 0.002 s
Read times 90th %ile: 0.001 s
Read times 75th %ile: 0.001 s
Read times 50th %ile: 0.001 s
Read times 25th %ile: 0.001 s
Read times Min: 0.001 s

Cleaning up 256 objects...
Deleting a batch of 256 objects in range [0, 255]... Succeeded
Successfully deleted 256/256 objects in 99.1872ms

```

5. 总结

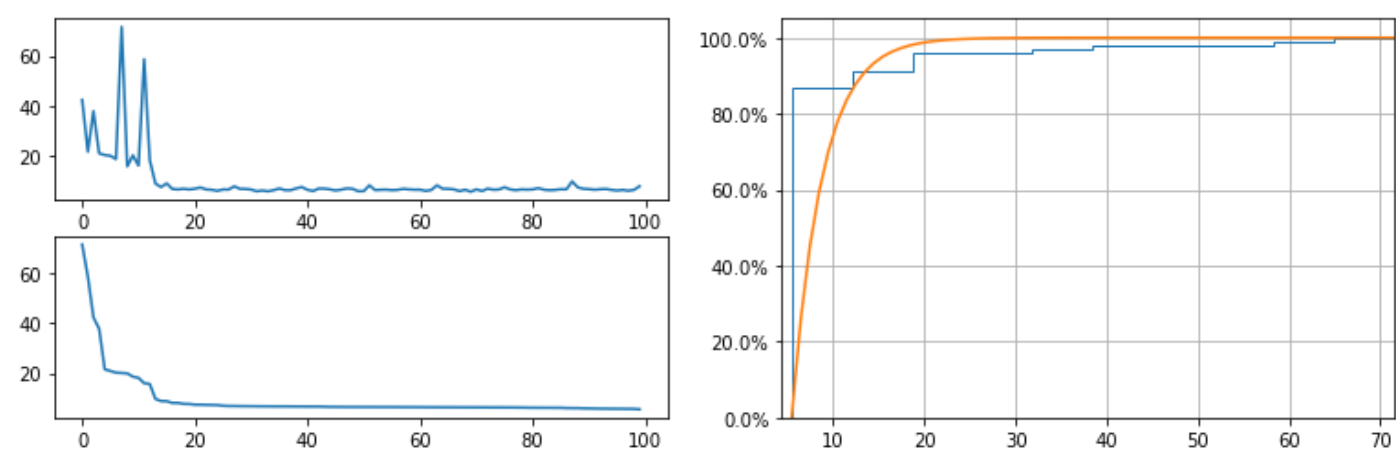
吞吐率Throughput，延迟Latency，以及环境参数：对象尺寸、并发性、服务器数量

numClients	numSamples	objectSize	吞吐率 (写) MB/s	总延迟 (写) s	吞吐率 (读) MB/s	总延迟 (读) s
8	256	1024	0.21	1.186	9.11	0.027
16	256	1024	0.14	1.725	9.64	0.026
8	512	1024	0.18	2.805	9.63	0.052
8	256	2048	0.39	1.291	18.59	0.027

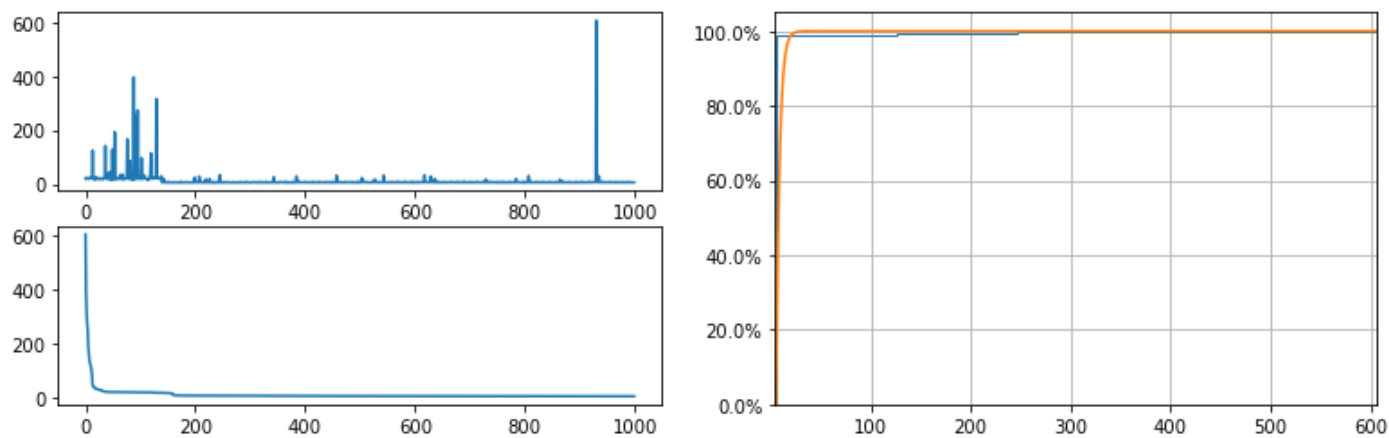
实验三：尾延迟挑战

1. 原始尾延迟现象，排队论

队列长度100



队列长度1000



大部分数据都可以在20ms内发送出去，但有少数延迟很高。