

華中科技大學

# 实验报告

课程名称：对象存储入门实践

专业班级：计算机硕 2108 班

学 号：M202173786

姓 名：孙锐

指导教师：施展

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计算机科学与技术学院

## 实验一：系统搭建

系统环境：python, minio

下载 minio, 运行作业仓库中的脚本。

```
C:\Windows\system32\cmd.exe
API: http://10.12.51.173:9000 http://192.168.220.1:9000 http://192.168.49.1:9000 http://127.0.0.1:9000
RootUser: hust
RootPass: hust_obs

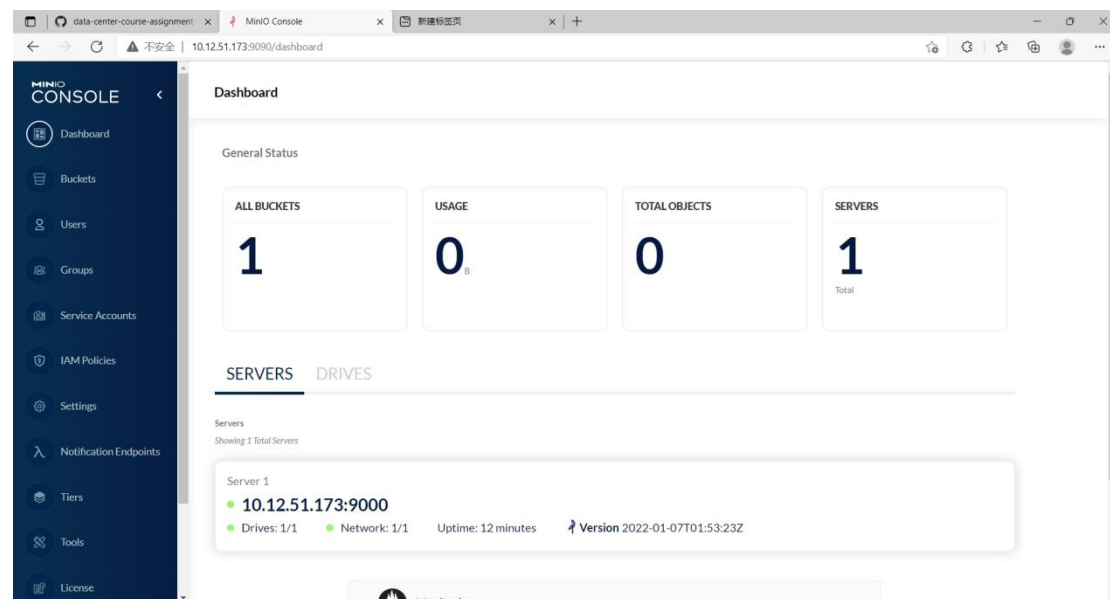
Console: http://10.12.51.173:9090 http://192.168.220.1:9090 http://192.168.49.1:9090 http://127.0.0.1:9090
RootUser: hust
RootPass: hust_obs

Command-line: https://docs.min.io/docs/minio-client-quickstart-guide
$ mc.exe alias set myminio http://10.12.51.173:9000 hust hust_obs

Documentation: https://docs.min.io

API: AccountInfo()
Time: 06:58:57 UTC 01/07/2022
DeploymentID: 465f676d-b0cf-4693-9742-90e7fbcdc08b
RequestID: 16C7EAC8D234047C
RemoteHost: 10.12.51.173
Host: 10.12.51.173:9000
UserAgent: MinIO (windows; amd64) madmin-go/0.0.1
Error: config file not found (*errors.errorString)
2: cmd\admin-handlers-users.go:1091:cmd.adminAPIHandlers.AccountInfoHandler()
1: net\http\server.go:2047:http.HandlerFunc.ServeHTTP()
```

打开相应的网址，输入用户名和密码，可以进入，根据作业仓库的操作提示，可以创建一个 bucket。



## 实验二：性能测试

性能测试的指标：吞吐率 Throughput、延迟 Latency，以及环境参数：对象尺寸 object size、并发性、服务器数量。

默认参数为：-numClients=8 -numSamples=256 -objectSize=1024

```
Results Summary for Write Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 0.16 MB/s
Total Duration: 1.542 s
Number of Errors: 0
-----
Write times Max: 0.116 s
Write times 99th %ile: 0.094 s
Write times 90th %ile: 0.075 s
Write times 75th %ile: 0.061 s
Write times 50th %ile: 0.046 s
Write times 25th %ile: 0.033 s
Write times Min: 0.010 s

Results Summary for Read Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 2.37 MB/s
Total Duration: 0.106 s
Number of Errors: 0
-----
Read times Max: 0.008 s
Read times 99th %ile: 0.007 s
Read times 90th %ile: 0.005 s
Read times 75th %ile: 0.004 s
Read times 50th %ile: 0.003 s
Read times 25th %ile: 0.002 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 239.1442ms
```

设置参数为：-numClients=16 -numSamples=256 -objectSize=1024

```
Results Summary for Write Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 0.12 MB/s
Total Duration: 2.056 s
Number of Errors: 0
-----
Write times Max: 0.221 s
Write times 99th %ile: 0.204 s
Write times 90th %ile: 0.167 s
Write times 75th %ile: 0.149 s
Write times 50th %ile: 0.123 s
Write times 25th %ile: 0.108 s
Write times Min: 0.024 s

Results Summary for Read Operation(s)
Total Transferred: 0.250 MB
Total Throughput: 5.50 MB/s
Total Duration: 0.045 s
Number of Errors: 0
-----
Read times Max: 0.007 s
Read times 99th %ile: 0.005 s
Read times 90th %ile: 0.004 s
Read times 75th %ile: 0.003 s
Read times 50th %ile: 0.003 s
Read times 25th %ile: 0.002 s
Read times Min: 0.001 s
```

设置参数为: -numClients=8 -numSamples=512 -objectSize=1024

```
Results Summary for Write Operation(s)
Total Transferred: 0.500 MB
Total Throughput: 0.16 MB/s
Total Duration: 3.182 s
Number of Errors: 0
-----
Write times Max: 0.108 s
Write times 99th %ile: 0.105 s
Write times 90th %ile: 0.073 s
Write times 75th %ile: 0.063 s
Write times 50th %ile: 0.050 s
Write times 25th %ile: 0.035 s
Write times Min: 0.010 s

Results Summary for Read Operation(s)
Total Transferred: 0.500 MB
Total Throughput: 5.62 MB/s
Total Duration: 0.089 s
Number of Errors: 0
-----
Read times Max: 0.005 s
Read times 99th %ile: 0.004 s
Read times 90th %ile: 0.002 s
Read times 75th %ile: 0.002 s
Read times 50th %ile: 0.001 s
Read times 25th %ile: 0.001 s
Read times Min: 0.001 s
```

实验结果汇总:

参数			实验结果 (MB/s 或 s)			
numClients	numSamples	objectSize	吞吐量 (写)	总延迟 (写)	吞吐量 (读)	总延迟 (读)
8	256	1024	0.16	1.542	2.37	0.106
16	256	1024	0.12	2.056	5.50	0.045
8	512	1024	0.16	3.182	5.62	0.089

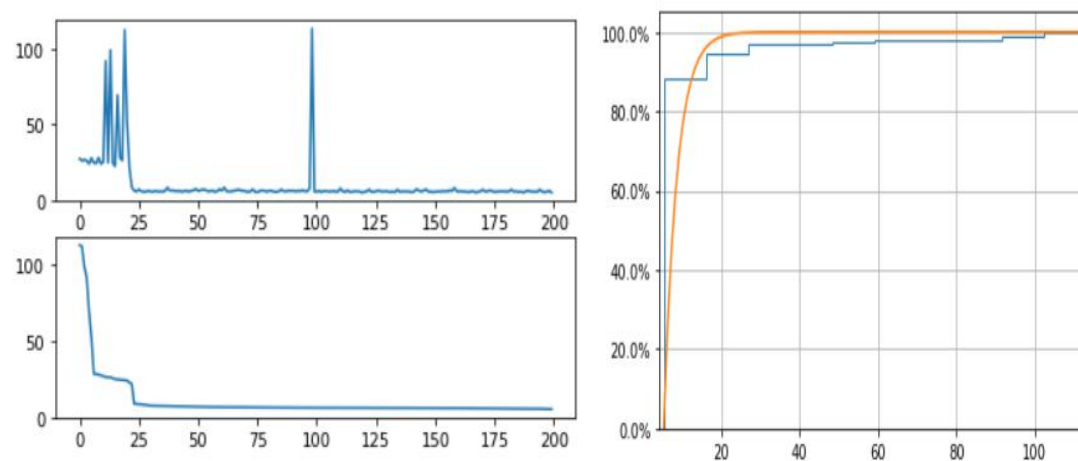
实验三：尾延迟

用排队模型来测试数据，修改任务的数量从而观测不同的实验结果:

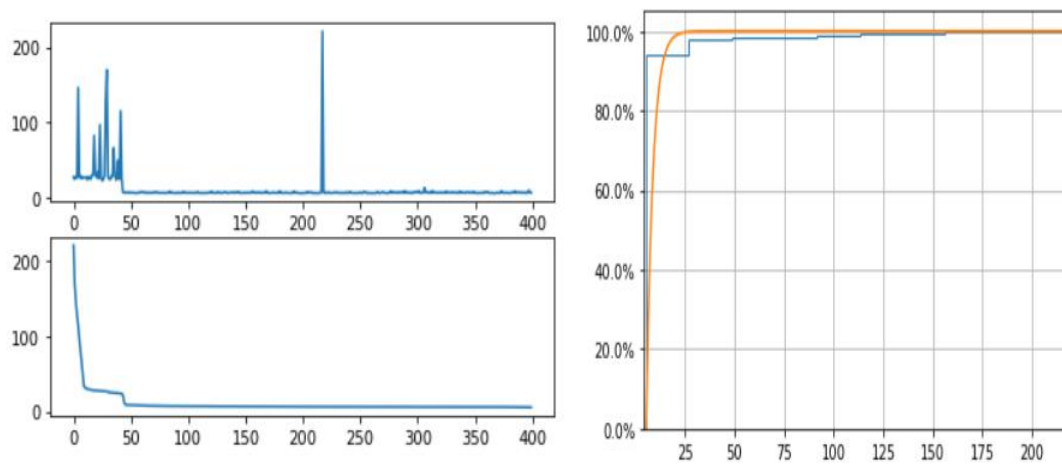
```
latency = []
failed_requests = []

with tqdm(desc="Accessing S3", total=1000) as pbar:
    with ThreadPoolExecutor(max_workers=1) as executor:
        futures = [
            executor.submit(
                arrival_rate_max,
                session.resource('s3', endpoint_url=local_s3), i) for i in range(1000) # 为保证线程安全, 应给每个任务申请一个新 resource
        ]
        for future in as_completed(futures):
            if future.exception():
                failed_requests.append(futures[future])
            else:
                latency.append(future.result()) # 正确完成的请求, 采集延迟
        pbar.update(1)
```

200 项任务：



400 项任务：



1000 项任务：

