

Homework 3 - Log & File Maintenance

Description

1. **Deadline: 2023-05-18 (Thu.) 23:59 (UTC+8)**
2. Operating system: FreeBSD 13.1-RELEASE
3. Online Judge: <https://sa.imslab.org>
4. TA's email: nasa@imslab.org
5. Total: 100 points.

General Goals

- Setup ZFS filesystem.
- Learn how to use logrotate.
- Playaround ZFS snapshot mechanism.

Precautions

- **DO NOT ATTACK JUDGE SYSTEM OTHERWISE YOU WILL FAIL THIS COURSE!!!**
- You can use other linux distro, but we only guarantee you can get 100% points on FreeBSD 13.1-RELEASE.
- You can submit multiple judge requests. However, OJ will cool down for several minutes after each judge.
- Late submissions will not be accepted.
- **BACKUP** or **SNAPSHOT** your server before judging **EVERY TIME**.
- Make sure everything is fine after reboot.

Tasks & Requirements

General

- Add three 1GB disks on FreeBSD VM and enable ZFS services.
 - Make sure ZFS will automatically mount after reboot.
- Install logrotate with pkg.

ZFS Configuration

- Create a ZFS [RAID-Z](#) pool named **sa_pool** and three 1G disks as devices.

```
wilicw@freebsd ~> sudo zpool list -Ho name,size
sa_pool 2.75G
wilicw@freebsd ~> sudo zpool status sa_pool
pool: sa_pool
state: ONLINE
config:

    NAME      STATE    READ WRITE CKSUM
    sa_pool    ONLINE   0     0     0
    raidz1-0    ONLINE   0     0     0
        nda1    ONLINE   0     0     0
        nda2    ONLINE   0     0     0
        nda3    ONLINE   0     0     0
```

- Make a new file system called **data** in pool **sa_pool**, set the following properties **compression=lz4**, **copies=2**, **atime=off** and mount it at **/sa_data**.

```
wilicw@freebsd ~> sudo zfs list sa_pool/data
NAME          USED  AVAIL    REFER  MOUNTPOINT
sa_pool/data  30.6K  1.71G    30.6K  /sa_data
```

- Set /sa_data permission to **drwxr-xr-x**.
- Change the /sa_data directory owner and group to root/wheel.

Logrotate

- Add a logrotate configuration file in `/etc/logrotate.d/fakeLog`, and then satisfy the following requirements
 - Set the number of log files to rotate to 10.
 - Set the maximum size of each log file to 1k.
 - Copies the log files to the `/var/log/fakeLog/` directory.
- Download a [program](#) from gist to simulate a running server with a log generation function (you can read this program, but you don't need to edit it).
 - This program will generate a log file in `/var/log/fakeLog.log`, then add a one line of new log every 0.1 second, the magic_number you specify will decide how many times it will run.
 - This program can run like `./fakeLoggen.py <magic_number>` you can randomly pick a number as magic_number. e.g. `./fakeLoggen.py 55`
 - add `--logrotate` options can do logrotate `/etc/logrotate.d/fakeLog` after adding a new log to `/var/log/fakeLog.log`. e.g. `./fakeLoggen.py 55 --logrotate`


```
root@freebsd:~ # rm /var/log/fakeLog/*
root@freebsd:~ # ./fakeLoggen.py 55 --logrotate
root@freebsd:~ # ls -lah /var/log/fakeLog
total 96
drwxr-xr-x  2 root  wheel  512B Apr 24 07:00 .
drwxr-xr-x  4 root  wheel  1.0K Apr 24 07:00 ..
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.1
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.10
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.2
-rw-r--r--  1 root  wheel  1.0K Apr 24 07:00 fakeLog.log.3
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.4
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.5
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.6
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.7
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.8
-rw-r--r--  1 root  wheel  1.1K Apr 24 07:00 fakeLog.log.9
```

ZFS Managing tools

- Implement the following functionally with any programming language (python is recommended).
- The tool can be executed by any user with **sabktool** (not ./sabktool).
- The tool can execute correctly with any user which in sudoers and NOPASSWD.
- Print the help message using the **help** command.

Usage:

```
create <snapshot-name>
remove <snapshot-name> | all
list
roll <snapshot-name>
logrotate
```

- Create a snapshot using the **create** command.
 - Need design parameters to give the snapshot name.
 - e.g. **sabktool create now** # will create a snapshot named now to sa_pool/data
- Remove a snapshot using the **remove** command.
 - Need design parameters to give the snapshot name.
 - **remove all** will remove all snapshots created.
 - e.g. **sabktool remove now** #will remove a snapshot named now to sa_pool/data
 - e.g. **sabktool remove all** #will remove all snapshot to sa_pool/data
- List all snapshots using **list** command.
 - Just need to print the snapshots name.
- Rollback the snapshot using the **roll** command.
 - Need design parameters to give the snapshot name.
 - e.g. **sabktool roll now** #will rollback a snapshot named now to sa_pool/data

- Logrotate to zfs using the **logrotate** command.
 - Logrotate configuration file satisfy the following requirements.
 - Set the number of log files to rotate to 10.
 - Copies the log files to the `/sa_data/log` directory.
 - This method will rotate `/var/log/fakelog.log` log.
 - You need to generate log file with the above program by e.g./fakeloggen.py 55.

```

root@freebsd:~ # rm /sa_data/log/*
root@freebsd:~ # ./fakeloggen.py 55
root@freebsd:~ # sabktool logrotate
root@freebsd:~ # ls -lah /sa_data/log/
total 8
drwxr-xr-x  2 root  wheel   3B Apr 24 06:55 .
drw-r--r--  3 root  wheel   3B Apr 24 06:30 ..
-rw-r--r--  1 root  wheel  15K Apr 24 06:55 fakelog.log.1

```

This command can help you to clean the log file after every test.

- `rm /sa_data/log/* /var/log/fakelog.log.* /var/log/fakelog/*`

Grading

Tasks	Check Conditions	Testing Commands	Score
General (20%)			
check has three 1G disk.		<code>geom disk list egrep -o 'Mediasize:.*\ (1.0G\)' wc -l #return 3</code>	10
Make sure ZFS will automatically mount after reboot.		<code>service -e grep '^/etc/rc.d/zfs\$' #return /etc/rc.d/zfs</code>	5
Check logrotate has installed.			5
ZFS Configuration (20%)			
check sa_pool zpool has been created successfully.		<code>sudo zpool list -Ho name #contain sa_pool</code>	5
check sa_pool/data zfs has been created successfully.	check sa_pool zpool has been created successfully.	<code>sudo zfs get -o value mountpoint sa_pool/data tail -1 #return /sa_data sudo zfs get -o value compression sa_pool/data tail -1 #return lz4 sudo zfs get -o value copies sa_pool/data tail -1 #return 2 sudo zfs get -o value atime sa_pool/data tail -1 #return off</code>	5
check /sa_data permission.	check sa_pool/data zfs has been created successfully.	<code>ls -l / grep sa_data cut -d ' ' -f 1 #return drwxr-xr-x</code>	5
check /sa_data directory owner and group	check sa_pool/data zfs has been created successfully.	<code>ls -l / grep sa_data cut -d ' ' -f 5,7 #return root wheel</code>	5
Logrotate (35%)			
fakeloggen.py runs successfully.		<code>rm /sa_data/log/* /var/log/fakelog.log.* /var/log/fakelog/* The judge will randomly select a magic_number and re-downloads the program and run it.</code>	10

		<pre>randint=\$((514 + \$RANDOM % 5)) curl https://gist.githubusercontent. com/Vincent550102/fbc8a56bc0f6c 28624ce1e7b3b8a8c80/raw/c1f0eec 843e1121f99400c6adbae7cc5ddfe50 d2/fakeloggen.py python3 - \$randint --logrotate</pre>	
The number of logs under /var/log/fakelog/ is 10, and the file size is between 1k and 1.5k.	fakeloggen.py runs successfully.	<pre>ls -l /var/log/fakelog/ sed '1d' wc -l # return 10 ls -lh /var/log/fakelog/ tail -10 awk '{print \$5}' sed "s/K/" awk '{if (\$1 >= 1 && \$1 <= 1.5) print "Number is in range"; else print "Number is not in range"}' # all is Number is in range</pre>	25
ZFS Managing tools (25%)			
check sabktool can run create by other user.	check sa_pool/data zfs has been created successfully.	<pre>sabktool create ouo sabktool create ouo2 zfs list -r -t snapshot -o name /sa_data # return sa_pool/data@ouo sa_pool/data@ouo2</pre>	5
check sabktool list can run successfully.	check sabktool can run create by other user.	<pre>sabktool list # check sabktool list == zfs list -r -t snapshot -o name /sa_data</pre>	5
check sabktool roll can run successfully.	check sabktool can run create by other user.	<pre>touch /sa_data/newfile sabktool roll ouo ls /sa_data # does's contain newfile</pre>	5
check sabktool remove can run successfully.	check sabktool can run create by other user.	<pre>sabktool remove <snapshot name> zfs list -r -t snapshot -o name /sa_data grep 'sa_pool/data@<snapshot name>' sabktool remove all zfs list -r -t snapshot -o name /sa_data # check no return</pre>	5
check sabktool logrotate can run successfully.	check sa_pool/data zfs has been created successfully.	<pre>rm /sa_data/log/* /var/log/fakelog.log.* /var/log/fakelog/* randint=\$((514 + RANDOM % 5)) curl https://gist.githubusercontent. com/Vincent550102/fbc8a56bc0f6c 28624ce1e7b3b8a8c80/raw/c1f0eec 843e1121f99400c6adbae7cc5ddfe50 d2/fakeloggen.py python3 - \$randint sabktool logrotate ls -la /sa_data/log # contain one log file</pre>	5

Total	100
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Useful Resources

- [FreeBSD Handbook | FreeBSD Documentation Portal](#)
- [Oracle Solaris ZFS Administration Guide](#)
- [鳥哥的私房菜](#)
- [ChatGPT](#)