2016 SAP mid-term exam

Date/Time: 2016/11/10 PM 6:30 ~ 9:20, Open book, No Electronic Equipment!

Total Score: 120

1. Answer the questions below assuming that you are using FreeBSD 10.3-RELEASE.

2. Please arrange your time, we suggest that you answer the questions you know first.

3. Please answer the questions **in order**, or you will be punished for **10 points!!**

Part A. 54% (True or False. Answer the questions to obtain 20% points for each question. Please answer O for true and X for false. Don't use T and F)

1.   [   ] By default, you can login as root via SSH in FreeBSD 10.3.

2.   [   ] You must to take care about packages denpandency by yourself when you using `pkg` to manage application.

3.   [   ] Don't let normal user have access to /etc/passwd and /etc/group, it contains password hash and other sensitive infomation about other users.

4.   [   ] For `sudoers` and `master.passwd`, it's better to use `visudo` and `vipw` to edit, becase editing these files directly without those commannds will not take syntax check that may make config files broken.

5.   [   ] Using `sudo` may generate many annoying logs. For simplicity, using root account is better than normal user.

6.   [   ] By default, sudo commands logs to a logfile along with other system messages. Configure sudo so that it has its own logfile for easy visibility into the use of sudo and activities of the sudoers. Keeping an eye on failed sudo events are a qualified maintainer routine works.

7.   [   ] `for item in "$string" ; do …… ; done` is equivalent to `for item in $string ; do …… ; done`

8.   [   ] `if [ $option != "Y" ]; then exit ; fi` means that only if `$option` is "Y", `exit` will not be executed.

9. [ ] `nohup` is a command make a process ignore the `SIGHUP` signal, which means that process will not be terminated when the controlling terminal is closed.

10. [ ] The output of `echo ${var:=value}` and `echo ${var:-value}` are same to each other.

11. [ ] `cut -f 1,3 -d ','` and `awk -F',' '{print $1","$3}'` are functionally equal.

12. [ ] In `/bin/sh`, we can use `export var=x` to set a global variable `var` with `x` value.

13. [ ] `ls *test[135]*` and `ls | grep test1 | grep test3 | grep test5` are functionally equal.

14. [ ] `sed -e '/2222/p'` and `grep 2222` are functionally different.

15. [ ] Phd.ate can use `trap` to ignore all signals from `kill -1 -2 -3 -15`.

16. [ ] In NFS, it must work with Remote Procedure Call.

17. [ ] In NFS, the access control of files is based on the user id and group id.

18. [ ] We need to start `/etc/rc.d/nfsclient` or have `nfs_client_enable="YES"` in `rc.conf` at boot time for NFS clients to work.

19. [ ] NFSv1 have never been used in public domain.

20. [ ] UEFI operates in real mode; thus, its capability is limited.

21. [ ] When cloning a snapshot in ZFS with `zfs clone`, it literally copys data from the snapshot to the destination dataset byte by byte.

22. [ ] Partition type collision is very likely to happen in MBR.

23. [ ] Currently in FreeBSD, ZFS supports native encryption.

24. [ ] Most of the time, you can shuffle the disks in a zpool without side effects.

25. [ ] Hard-links can be created across partitions, while soft-links can't.

26. [ ] Inode associates filename with actual data blocks.

27. [ ] Vdevs in a zpool must be of same size in order for stripe to work.

Part B. 34% (Multiple-Choice Question. Choose only one answer out of each question. 2% for each question)

1. [ ] RAID-5 is a commonly used RAID scheme, but ZFS uses RAID-Z instead. What is the main defect of RAID-5 that RAID-Z has fixed?
   1. Disk striping
   2. Sequential read performance
   3. Write hole
   4. Degradation and rebuilding

2. [ ] Which following command can install pre-compiled (e.g. sudo) package in latest FreeBSD.
   1. deb install
   2. apt-get install

3. yum install
4. brew install
5. pkg install
6. All of the above

3.   [   ] How can you add a new user?
    1. adduser
    2. vipw
    3. pw useradd
    4. All of the above

4.   [   ] What are the actual benefits of assigning sudo privileges to a user instead of using root?
    (A) You aren't giving out your root password.
    (B) You aren't giving away the keys to the kingdom. You can specify what you want of commands that users can run.
    (C) You can manage authorization centrally for an entire network.
    (D) There's an audit trail.
    1. BCD
    2. AC
    3. ABCD
    4. BD

5.   [   ] Below is the output of "ls -al", what is the permission bit of README file.

```
-rwSrwSr-- 1 www-data www-data 45 2012-01-04 05:17 README
```

    1. 5566
    2. 6664
    3. 6774
    4. 6764

6.   [   ] Which of following commands will sort files and directories by size in your home diretory? (The envorinment is `/bin/sh`)
    CMD="ls -al ~/ | sort -k 5,5 -n | awk '{ printf \$5 \" \" \$9 \"\n\" }'"
    1. $($CMD)
    2. $0 -c "$CMD"
    3. `$CMD`
    4. All of them
    5. None of them

7. [ ] Which of the following is equal to (argc, argv) in the C language?
   1. ($#, $*)
   2. ($@, $*)
   3. ($#, $?)
   4. ($#, $@)

8. [ ] Which of following commands behaves the same to others?
   (A) `if [ "$a" -gt "$b" ] ; then echo "haha" ; fi`
   (B) `[ ! "$a" -le "$b" ] || echo "haha"`
   (C) `[ ! "$a" -lt "$b" ] && [ ! "$a" -eq "$b" ] && echo "haha"`
   (D) `[ ! "$a" -lt "$b" -a "$a" != "$b" ] && echo "haha"`
   1. ABCD
   2. ACD
   3. AD
   4. AC

9. [ ] What is the output of following commmands?
   ```
   $ echo "Alpha" > a ; echo "Beta" > b; echo "Gamma" > c;
   $ ln -s a f1; ln b f2; cat c > f3;
   $ mv f3 f2; rm -f a ; mv b a ;
   $ cat f1
   ```
   1. Alpha
   2. Beta
   3. Gamma
   4. None of them

10. [ ] If you are using `/bin/tcsh` as your shell environment, which command do you need to execute a new command just installed in `$PATH`.
   1. pkg clean
   2. find
   3. rehash
   4. service tcsh restart

11. [ ] How can you get the return code of the last executed command?
   1. $1
   2. $?
   3. $$
   4. None of them

12.   [   ] Which of follwing commands is equivalent to `echo "$var" | sed -e 's/.*PHD//'`. (`$var` is an one-line string.)
1. echo "${var#*PHD}"
2. echo "${var##*PHD}"
3. echo "${var%%PHD*}"
4. echo "${var%%PHD*}"

13.   [   ] A machine in Network file system (NFS) can be _____.
1. client
2. server
3. both client and server
4. neither client nor server

14.   [   ] After you modified `/etc/exports` file, which service should be reload/restart to implement new configure.
1. mountd
2. nfsd
3. portmap
4. nfsiod

15.   [   ] Which description of `portmap` is most accurate. (Check all that apply)
1. maintains status information on all the NFS filesystems.
2. forwards incoming network connections to the appropriate RPC facility.
3. provided NFS function.
4. maps NFS clients to their associatedaccess privileges.
5. converts RPC sequence numbers into DARPA protocol port numbers.

16.   [   ] NFS uses a security concept called _____ to prevent a user from gaining access to a user account on the NFS server simply because the user has the same ID on the NFS client.
1. Screening
2. Filtering
3. Squashing
4. Mapping

17.   [   ] Which of the following feature is not supported by ZFS?
1. NFS integration
2. Transparent compression
3. Snapshot
4. File level cloning

Part C. 32% (Describe answers to each question)

1.   [4%: Shell Programming]

`grep -v ^word` will mean invert-match. Print line if pettern is not matched. You need to use 2 different commands to achieve the function of `grep -v ^word`.

1. sed
2. awk

2.   [5%: Shell Programming]

`lsof` is a command which lists open files.

Here is an example output of `lsof`.

```
COMMAND PID USER  FD   TYPE DEVICE          SIZE/OFF NODE NAME
vim     156 yench txt VREG 234,1718353949 773912 430529 /too/long
vim     156 yench txt VREG 234,1718353949 103032 430273 /too/long.2
vim     156 yench 0u  VCHR 0,128           0t15435  128 /dev/pts/40
vim     156 yench 1u  VCHR 0,128           0t15435  128 /dev/pts/40
vim     156 yench 4u  IPv4 0xfffff800981c26d8 0t0 UDP *:13212
```

Write a one-line shell script to grap lines with the VREG type and rearrange it as the following sample.

```
file: /too/long
|---- user: yench
|---- command: vim
file: /too/long.2
|---- user: yench
|---- command: vim
```

Note: You should begin with "`lsof | `".

(If you answer this question without `awk` and command subsititution, e.g. ` `, `$()`, you can get 3 more points as a bonus. Keeping original answer is allowed.)

3.   [3%: Executable files]

At Homework 2, TA asked you to make your shell script executable via the command `chmod +x sahw2-1.sh`, then you can use `./` (point splash) to execute your script. How does FreeBSD know using `/bin/sh` to execute it? Please explain it.

4.   [3%: ZFS]

Say you've messed up by accidentally deleting an important file on a ZFS dataset; fourtunately, some wise man just created a snapshot last week. Considering multiple files in that very dataset were modified since last week, rollback the entire dataset might just lead to another disaster. How do you recover that specific file?

5. **[3%: GPT]**

What is the difference between "Partition type GUID" and "Unique partition GUID" in GPT?

6. **[4%: GPT]**

What is the main drawback of using GEOM Label instead of GPT Label?

7. **[3%: File Permission]**

What is the permission of newly created files and directories, respectively, when umask is set to 007?

8. **[4%: GPT]**

What is the purpose of Protective MBR in GPT?

9. **[3%: File Permission]**

The /etc/master.password is root read-write only, please explain why a normal user can change his/her password via passwd command?