Operating Systems CO-562

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Assignment 9

Problem 9.1

(a)

What is the program doing?

It opens a file that is provided as reading command line argument and, afterwards, forks child process every 2 seconds. Child process tries to go to the beginning of the file and copies it to std. output, while parent process keeps the file open.

(b)

What happens if you append content to the file foo while catloop is running?
```
$ echo "world" >> foo
```
What happens if you truncate the file foo while catloop is running?
```
$ truncate -s 0 foo
```

When the file is read again, it makes visible the content of that file.

Here the content becomes visible as well.

(c)

Discuss the advantages and disadvantages of the behavior you have observed in the previous step. Could there be other file system update semantics?

truncate removes and write the content of the file, whereas echo appends the file, i.e. writes it at the end.

(d)

What happens if you change the permissions of the file foo while catloop is running?
```
$ chmod 0 foo
```

```
$ ls -l foo
```

Changing the permissions will not affect open files, since permissions are checked only once – when we open a file.

(e)

What happens if you remove the file foo while catloop is running?
```
$ rm -f foo
```

What are possible implications of this behavior? The file itself will be removed, but as there are exist open files descriptors that refer to it the content will remain accessible, i.e. the content will be accessible as long as `catloop` parent process will be running.

Problem 9.2

(a)

Who has which access permissions for the file foo?
```
$ ls -l foo
-rwxrw-r-- 1 schoenw adm 0 Nov 30 14:53 foo
```

The owner – `schoenw` – has permission to read, write and execute. `adm` – has read and write, whereas everyone else has only read permission.

(b)

Who has which access permissions for the directory bar?
```
$ ls -ld bar
drwx-wx--- 2 schoenw adm 4096 Nov 30 14:56 bar
```

The owner – `schoenw` – has permission to read, write and execute. Execute permissions on a directly mean it is possible to traverse the directory. `adm` – has write and execute, whereas everyone else has no access permission.

(c)

Can a member of the group adm (who is different from schoenw) read the content of the directory bar? Can a member of the group adm (who is different from schoenw) create a file in the director bar? Explain.

The member of the group `adm` CANNOT read the content of the directory bar, since `adm` has no read permission to read the content of the directory bar,

but since `adm` has write and execute permissions, he/she CAN create a file in the directory bar.

(d)

A regular user (with a umask of 0022) executes the following shell command. What are the file permissions of the file that is created and who is the owner of the file?

```
$ rm -f world
$ sudo echo hello > world
```

The permissions:

```
$ ls -l world
-rw-r--r-- 1 schoenw schoenw 6 Nov 12 20:11 world
```

The `sudo` command makes the `echo` to be executed with root permission. However, since the shell setted up output redirection before `sudo`, the owner is the user who ran the shell.

(e)

What is the meaning of the following access permissions?

```
$ ls -l /usr/bin/sudo
-rwsr-xr-x 1 root root 157760 Jan 11 2016 /usr/bin/sudo
```

s-bit set on user access permission shows that file will be executed with the permissions of the file owner, `root` in this case, instead of the permissions of the user that invokes one of the `exec()` system calls. Here, everyone has permissions to read and execute the `sudo` command.