IC221 System Programming
Spring 2014
HW10

NAME:_____

COLLABORATOR(S):_____

1. Match the kernel data structure to their description: 10/8/5/3/1/0

Process Table ___

File Descriptor Table ___

i-node ___

v-node ___

Open File Table ___

(a) Represents the file block as stored on the device with information about how to read and write the file on the specific device

(b) Stores all files open by a process indexed by file descriptor

(c) Stores all files open across all processes

(d) Provides an abstraction layer so all I/O appear the same to user-level process

(e) Stores information about all current running processes

(f) Stores the current list of accessible devices

10/8/5/3/1/0

2. For the following code segment, draw the relevant kernel data structure entries based on the following code:

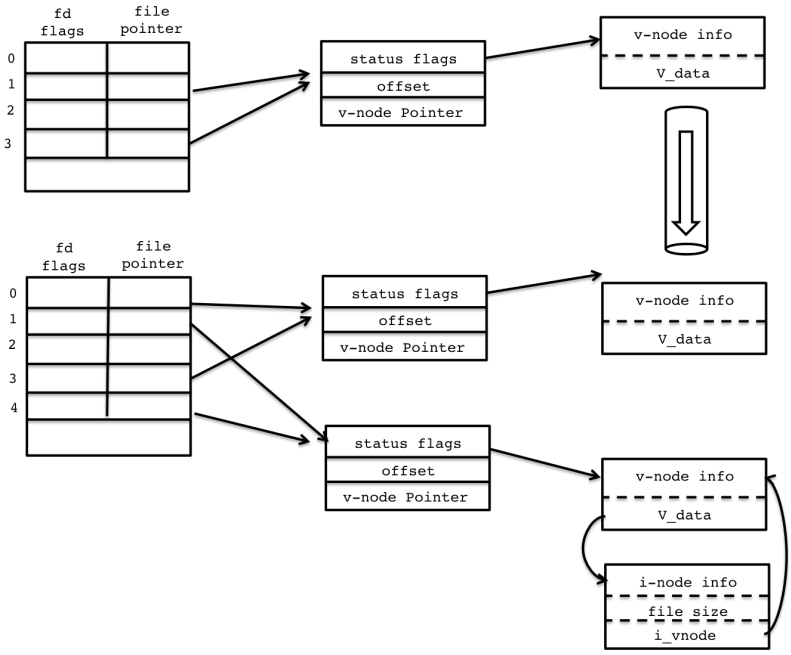
```
int main(){
    int i;
    int fd = open(/*tmp.txt*/);

    for(i=0;i<2;i++){
     if( fork() == 0){
        /*do something*/
     }else{
        /*do something*/
     }
    }
}
```


_/20

NAME: _____

3. Describe the possible command line execution that could result in the following linking of the kernel data structures:

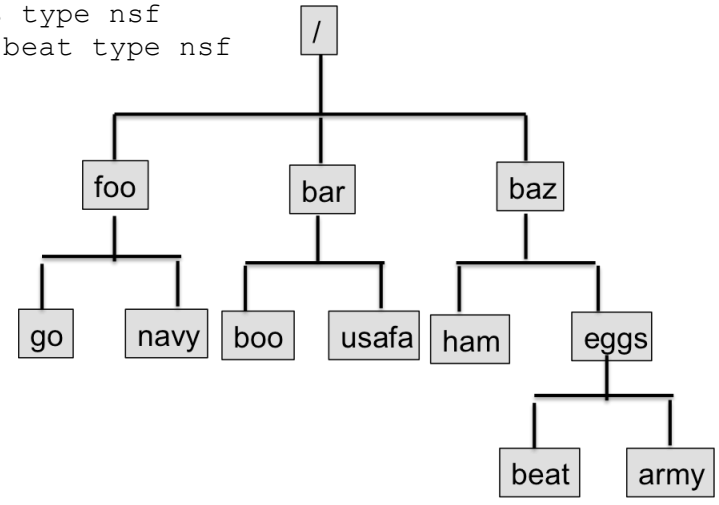
10/8/5/3/1/0



4. Given the mount information, **circl**e each of the different file systems, draw an **arrow** to each mount point, and **label** each file system with the device.

10/8/5/3/1/0

```
/dev/sdb2 on / type ext4 (rw)
/dev/sdb3 on /foo type ext4 (rw)
zee:/home/mids /baz/eggs type nsf
why:/home/scs /baz/eggs/beat type nsf
```



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NAME: _____

5. With respect to the kernel data structures, what is a hard link? 5/3/1/0

6. With respect to the kernel data structures, what is a symbolic link? 5/3/1/0

7. For the following **ls -l** output how many i-nodes are present? Explain. 8/5/3/1/0

```
-rw-r----- 2 aviv scs 0 Mar 23 22:15 a
-rw-r----- 2 aviv scs 0 Mar 23 22:15 b
lrwxrwxrwx 1 aviv scs 1 Mar 23 22:16 c -> c
lrwxrwxrwx 2 aviv scs 1 Mar 23 22:16 d -> a
lrwxrwxrwx 2 aviv scs 1 Mar 23 22:16 e -> a
```

8. Explain the total number of links in the following **ls -l** output: 7/5/3/1/0

```
drwxr-x--- 2 aviv scs 4096 Mar 23 22:16 .
```


__/25

NAME: _____

9. Why are hard links not allowed across different mounted file systems while symbolic links are? 5/3/1/0

10. For the following **lseek()** system calls, match the call with the result. 10/8/6/3/0

lseek(fd, 0, SEEK_SET) __	(a) Retrieve the current read/write offset with adjusting the current offset
lseek(fd, 20, SEEK_SET) __	(b) Move the read/write offset to the end of the file
lseek(fd, 0, SEEK_END) __	(c) Move the read/write offset to the start of the file
lseek(fd,20,SEEK_CUR) __	(d) Move the read/write offset to 20 bytes from the current position
	(e) Move the read/write offset to 20 bytes from the start of the file
lseek(fd,0,SEEK_CUR) __	(f) Move the read/write offset to 20 bytes from the end of the file

11. For each of the standard library file pointer operations provide the equivalent **lseek()** operations:

5/3/1/0 ftell()

5/3/1/0 rewind()

5/3/1/0 fsetpos(stream, 20)

5/3/1/0 fgetpos(stream, 20)

_/35