5/3/1/0

1. Match the kernel data structure to their description?

Process 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

File Descriptor Table ___

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

i-node ___

(c) Stores all files open across all processes

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

v-node ___

(e) Stores information about all current running processes

Open File Table ___

(f) Stores the current list of accessible devices

10/8/5/2/0

2. For the following code segment, draw the relevant kernel data structure entries for the process table, open file table, and v-node/i-nodes 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*/
     }
    }
}
```

Process Table	Open File Table	v-node/i-node

___/15

10/8/5/2/0

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
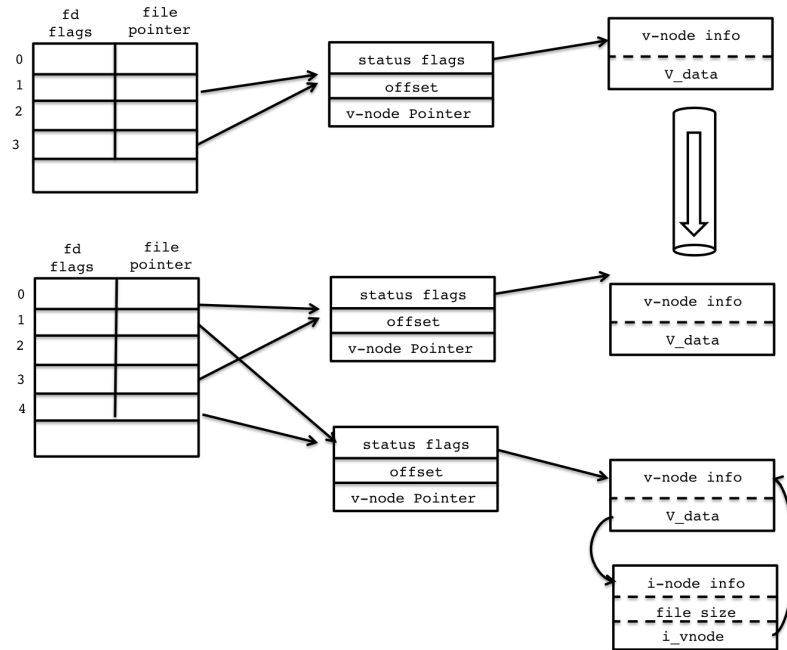
10/8/5/2/0

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.

```
/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
```


___/15

7/5/3/0

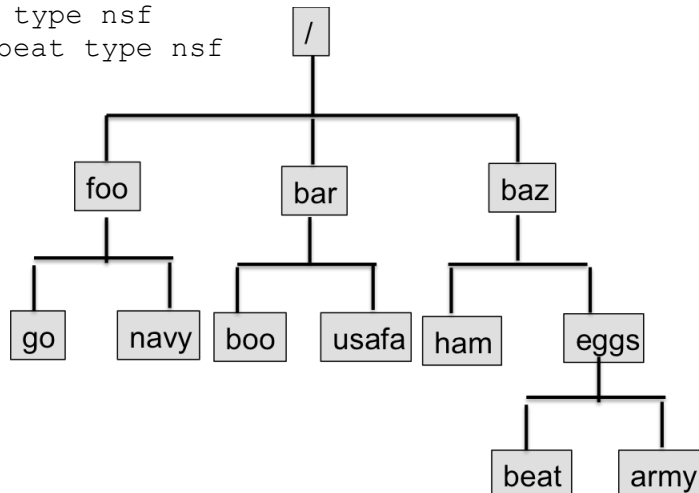5. With respect to the kernel data structures, what is a hard link?   5/3/1/0

```
┌─────────────────────────────────────────────────────────────┐
│                                                             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
└─────────────────────────────────────────────────────────────┘
```

7/5/3/0

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

```
┌─────────────────────────────────────────────────────────────┐
│                                                             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
└─────────────────────────────────────────────────────────────┘
```

7. Consider the following ls -l output, where all hard and symbolic links occur within the same directory.

```
-rw-r----- 2 aviv scs 0 Mar 25 12:25 a
-rw-r----- 1 aviv scs 0 Mar 25 12:25 b
lrwxrwxrwx 1 aviv scs 1 Mar 25 12:25 c -> c
-rw-r----- 2 aviv scs 0 Mar 25 12:25 d
lrwxrwxrwx 1 aviv scs 1 Mar 25 12:25 e -> a
-rw-r----- 1 aviv scs 0 Mar 25 12:25 f
```

8/6/3/0

a) How many symbolic links are present? What is linked to what?

```
┌─────────────────────────────────────────────────────────────┐
│                                                             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
└─────────────────────────────────────────────────────────────┘
```

8/6/3/0 b) How many hard links are present? What is linked to what?

```
┌─────────────────────────────────────────────────────────────┐
│                                                             │
│                                                             │
│                                                             │
│                                                             │
│                                                             │
└─────────────────────────────────────────────────────────────┘
```

___/30

8/6/3/0   8. Consider the following ls -l output:

           drwxr-x--- 2 aviv scs 4096 Mar 25 12:38 directory
        Why does the directory have 2 hard links?

```




```

8/6/3/0   9. Can a symbolic link link across two mounted file systems?
        Explain why or why not.

```




```

8/6/3/0   10. Can a hard link link across two mounted file systems?
        Explain why or why not.

```




```

8/6/3/0
        11. The unlink command is the same as rm when what condition
        is met? Explain.

```




```

8/6/3/0
        12. On lab computer, type the command mount. How many
        different file systems are mounted? What are their types?

```




```

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