

1A. Paste the two screenshots that you have taken

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan# pwd  
/home/ryan  
root@rgskinner:/home/ryan#
```

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan# pwd  
/home/ryan  
root@rgskinner:/home/ryan# ls -al  
total 132  
drwxr-xr-x 10 ryan ryan 4096 Apr 17 20:10 .  
drwxr-xr-x  7 root root 4096 Apr 17 01:54 ..  
-rw----- 1 ryan ryan 56939 Apr 17 20:10 .bash_history  
-rw-r--r-- 1 ryan ryan  220 May 15 2017 .bash_logout  
-rw-r--r-- 1 ryan ryan 3574 Apr 16 21:55 .bashrc  
drwx----- 3 ryan ryan 4096 Apr  9 13:58 .cache  
drwx----- 3 ryan ryan 4096 Apr 10 16:15 .config  
drwxr-xr-x  4 ryan ryan 4096 Apr 17 18:29 cron_report_script  
drwxr-xr-x  2 ryan ryan 4096 Apr 16 00:56 downloads  
-rw-r--r-- 1 ryan ryan  102 Apr 14 16:19 .gitconfig  
-rw----- 1 ryan ryan  52 Apr 14 17:31 .git-credentials  
drwx----- 3 ryan ryan 4096 Apr  9 13:58 .local  
-rw----- 1 ryan ryan  52 Apr 17 18:32 .my-credentials  
drwxr-xr-x  2 ryan ryan 4096 Apr 14 20:11 .nano  
-rw-r--r-- 1 ryan ryan  675 May 15 2017 .profile  
drwx----- 3 ryan ryan 4096 Apr  9 13:41 .secrets  
-rw-r--r-- 1 ryan ryan  66 Apr 10 00:49 .selected_editor  
-rw-r--r-- 1 ryan ryan  322 Apr 10 02:16 set_up  
drwx----- 2 ryan ryan 4096 Apr 16 00:13 .ssh  
-rw-r--r-- 1 ryan ryan  221 Apr 10 02:36 .wget-hsts  
root@rgskinner:/home/ryan#
```

B. Describe from where has the ls command has gotten the contents of the directory. What is a directory?

The directories data blocks store the i-nodes for the files in the directory

C.What is the absolute path to the folder that you are in?

Absoulte: /home/ryan

D.What is the relative path to this folder?

Relative: ~

2A. Paste a screenshot of the results

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan# df -B 4096 /  
Filesystem      4K-blocks    Used Available Use% Mounted on  
/dev/sda1        5154063 2241955   2694867  46% /  
root@rgskinner:/home/ryan#
```

B. Calculate the size of the root directory (/) in KB, MB, or GB

$5154063 \text{ blocks} * 4\text{KB/block} * 1/2^{30} = 19.66 \text{ GB}$

C. What is the path of the device to which root is mounted?

/dev/sda1 is mounted at /

D. Paste the screenshot of the results.

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan# df -i /  
Filesystem      Inodes    IUsed    IFree IUse% Mounted on  
/dev/sda1       1280000  111665  1168335    9% /  
root@rgskinner:/home/ryan#
```

E. How many i-nodes are available for root?

1280000 i-nodes

F. How many are currently used and how many are free?

Used: 111655; Free: 1168335

G. What is an i-node and where is it stored on the hard drive?

i-nodes are a data structure to link files to their blocks and are stored in the i-node table near the front of the partition.

H. What sort of information does it hold?

Attributes about the file and disk address for the files blocks.

3A. Paste the screenshots

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan# df -i /  
Filesystem      Inodes    IUsed    IFree IUse% Mounted on  
/dev/sda1       1280000  111665  1168335    9% /  
root@rgskinner:/home/ryan# df -B 4096 /  
Filesystem      4K-blocks    Used Available Use% Mounted on  
/dev/sda1       5154063  2241965   2694857   46% /  
root@rgskinner:/home/ryan# mkdir sandbox  
root@rgskinner:/home/ryan# df -i /  
Filesystem      Inodes    IUsed    IFree IUse% Mounted on  
/dev/sda1       1280000  111666  1168334    9% /  
root@rgskinner:/home/ryan# df -B 4096 /  
Filesystem      4K-blocks    Used Available Use% Mounted on  
/dev/sda1       5154063  2241966   2694856   46% /  
root@rgskinner:/home/ryan#
```

B. How does the i-node count differ between the two df -i screenshots with respect to the root volume?

One i-node has moved from free to used

C. How does the free-block count differ between the two df -B 4096 screenshots with respect to the root volume

One free block as been used

D. What has happened to cause these changes, explain?

One i-node was used to point to the directory file and one block was used for it's data

4A. What is the absolute path for src?

/home/ryan/sandbox/src

B. What is the relative path of dst if you were currently in src?

../dst/

C. Paste the screenshots

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan/sandbox/src# ls  
h_file s_file  
root@rgskinner:/home/ryan/sandbox/src#
```

C. Explain what the “..” represents in the command above.

.. means the parent folder

D. What is the absolute path of your current directory?

/home/ryan/sandbox/

E. Paste the screenshots

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan/sandbox/dst# df -B 4096 /  
Filesystem      4K-blocks    Used Available Use% Mounted on  
/dev/sda1        5154063 2241980   2694842  46% /  
root@rgskinner:/home/ryan/sandbox/dst# df -i /  
Filesystem      Inodes    IUsed   IFree IUse% Mounted on  
/dev/sda1       1280000 111669 1168331    9% /  
root@rgskinner:/home/ryan/sandbox/dst# ln ../src/h_file hard_link  
root@rgskinner:/home/ryan/sandbox/dst# df -B 4096 /  
Filesystem      4K-blocks    Used Available Use% Mounted on  
/dev/sda1        5154063 2241980   2694842  46% /  
root@rgskinner:/home/ryan/sandbox/dst# df -i /  
Filesystem      Inodes    IUsed   IFree IUse% Mounted on  
/dev/sda1       1280000 111669 1168331    9% /  
root@rgskinner:/home/ryan/sandbox/dst#
```

F. Describe and explain the changes in the free i-nodes for the root directory. Has the number of free block changed? If so/not, why/why not?

No change has been made, the dst and src directory both point to the same i-node, which points to the same block.

G. Paste the screenshots

```
ryan@rgskinner: ~  
root@rgskinner:/home/ryan/sandbox/dst# df -B 4096 /  
Filesystem      4K-blocks    Used Available Use% Mounted on  
/dev/sda1        5154063 2241986   2694836  46% /  
root@rgskinner:/home/ryan/sandbox/dst# df -i /  
Filesystem      Inodes    IUsed   IFree IUse% Mounted on  
/dev/sda1       1280000 111670 1168330    9% /  
root@rgskinner:/home/ryan/sandbox/dst# ln -s ../src/s_file soft_link  
root@rgskinner:/home/ryan/sandbox/dst# df -B 4096 /  
Filesystem      4K-blocks    Used Available Use% Mounted on  
/dev/sda1        5154063 2241987   2694835  46% /  
root@rgskinner:/home/ryan/sandbox/dst# df -i /  
Filesystem      Inodes    IUsed   IFree IUse% Mounted on  
/dev/sda1       1280000 111671 1168329    9% /  
root@rgskinner:/home/ryan/sandbox/dst#
```

H. Describe and explain the changes in the free i-nodes for the root directory. Has the number of free block changed? If so/not, why/why not?

An i-node and a block were used because a symbolic link is a type of file that points to another file

I. Describe and explain the results of the two cat commands?

The hard link printed the data from the block, while the soft did not, because it points to a nonexistent file, so there is no data to print