CS450-PA4
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Test Data

Equivalence Partitioning	
1 Unreachable empty directory	**2** Unreachable file
3 Multiple unreachable empty directories	**4** Multiple unreachable files
5 Tree of unreachable directories	
6 Multiple Trees	

1. Unreachable empty directory

```
$ mkdir d d/a
$ directoryWalker -h
. 1 1 512
./README 2 2 2286
./cat 2 3 16392
./echo 2 4 15244
./forktest 2 5 9548
./grep 2 6 18612
./init 2 7 15832
./kill 2 8 15272
./ln 2 9 15124
./ls 2 10 17764
./mkdir 2 11 15372
./rm 2 12 15348
./sh 2 13 27984
./stressfs 2 14 16260
./usertests 2 15 67368
./wc 2 16 17124
./zombie 2 17 14940
./directoryWalke 2 18 19084
./inodeTBWalker 2 19 17300
./Walkers 2 20 21588
./corruptor 2 21 16256
./console 3 22 0
./d 1 23 48
./d/a 1 24 32
```

```
$ corruptor d
d 1 23 48
$ directoryWalker -h
. 1 1 512
./README 2 2 2286
./cat 2 3 16392
./echo 2 4 15244
./forktest 2 5 9548
./grep 2 6 18612
./init 2 7 15832
./kill 2 8 15272
./ln 2 9 15124
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./directoryWalke 2 18 19084
./inodeTBWalker 2 19 17300
./Walkers 2 20 21588
./corruptor 2 21 16256
./console 3 22 0
$
```

A directory `d` is made holding a single directory `a`. Program `directoryWalker` can see them. However, after running `corruptor` on `d`, directory `a` is no longer reachable.

```
$ Walkers
Number of unreachable files: 1
1 24 32
$ directoryWalker -h
. 1 1 512
./README 2 2 2286
./cat 2 3 16392
./echo 2 4 15244
./forktest 2 5 9548
./grep 2 6 18612
./init 2 7 15832
./kill 2 8 15272
./ln 2 9 15124
./ls 2 10 17764
./mkdir 2 11 15372
./rm 2 12 15348
./sh 2 13 27984
./stressfs 2 14 16260
./usertests 2 15 67368
./wc 2 16 17124
./zombie 2 17 14940
./directoryWalke 2 18 19084
./inodeTBWalker 2 19 17300
./Walkers 2 20 21588
./corruptor 2 21 16256
./console 3 22 0
./lost+found-24 1 24 32
$
```

```
$ cd lost+found-24
$ /ls
.               1 24 32
..              1 1 512
$ cd .
$ cd ..
$ ls
.               1 1 512
..              1 1 512
README          2 2 2286
cat             2 3 16392
echo            2 4 15244
forktest        2 5 9548
grep            2 6 18612
init            2 7 15832
kill            2 8 15272
ln              2 9 15124
ls              2 10 17764
mkdir           2 11 15372
rm              2 12 15348
sh              2 13 27984
stressfs        2 14 16260
usertests       2 15 67368
wc              2 16 17124
zombie          2 17 14940
directoryWalke  2 18 19084
inodeTBWalker   2 19 17300
Walkers         2 20 21588
```

After running `Walkers`, the hanging directory was found and placed in the root as `lost+found-24` and it could be entered and left with `.` and `..` working properly.

2. Unreachable file

```
$ mkdir d
$ echo foo > d/a
$ corruptor d
d 1 23 48
$ Walkers
Number of unreachable files: 1
2 24 4
$ cat lost+found-24
foo
$
```

A similar scenario as before but now a very important file is placed in directory `d` before it is corrupted. `Walkers` recovers it as `lost+found-24` and we can still read its contents.

3. Multiple unreachable empty directories

```
$ mkdir d d/a d/b d/c
$ corruptor d
d 1 23 80
$ Walkers
Number of unreachable files: 3
1 24 32
1 25 32
1 26 32
$ ls
.              1 1 512
..             1 1 512
README         2 2 2286
```

We make multiple directories in `d` and corrupt `d` again. Now `a` `b` and `c` are all hanging. After calling `Walkers`, all the hanging directories are found and placed into the root directory.

```
inodeTBWalker  2 19 17300
Walkers        2 20 21588
corruptor      2 21 16256
console        3 22 0
lost+found-24  1 24 32
lost+found-25  1 25 32
lost+found-26  1 26 32
$
```

4. Multiple unreachable files

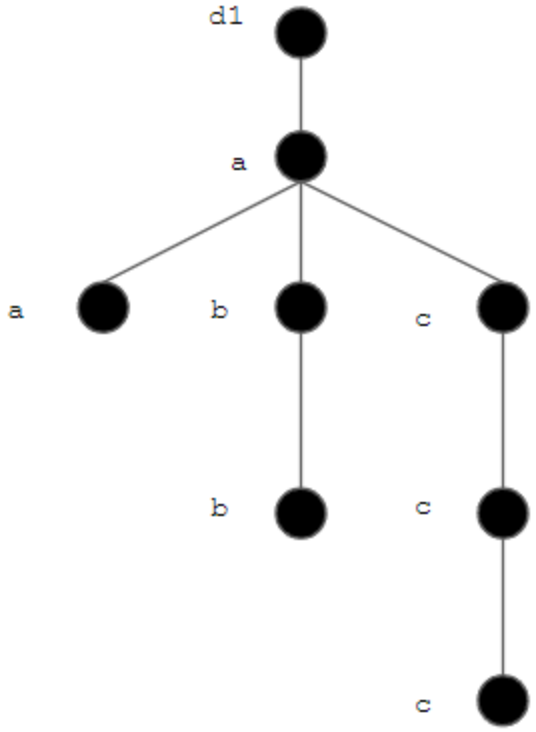
```
init: starting sh
$ mkdir d
$ echo foo > d/a
$ echo bar > d/b
$ echo cat > d/c
$ corruptor d
d 1 23 80
$ Walkers
Number of unreachable files: 3
2 24 4
2 25 4
2 26 4
$ cat lost+found-24
foo
$ cat lost+found-25
bar
$ cat lost+found-26
cat
```

We place multiple files in `d`, corrupt it, use `Walkers` to salvage them, and demonstrate that they are still readable.

5 Tree of unreachable directories

```
$ mkdir d1 d1/a d1/a/a d1/a/b d1/a/c
$ mkdir d1/a/b/b d1/a/c/c d1/a/c/c/c
$ directoryWalker -h
. 1 1 512
./README 2 2 2286
./cat 2 3 16392
```

```
./d1 1 23 48
./d1/a 1 24 80
./d1/a/a 1 25 32
./d1/a/b 1 26 48
./d1/a/b/b 1 28 32
./d1/a/c 1 27 48
./d1/a/c/c 1 29 48
./d1/a/c/c/c 1 30 32
$
```



We make a tree of directories that looks as such. Next we corrupt `d1`. So `d/a` and everything under it is unreachable. However after calling `Walkers`:

```
corruptor: cannot open d
$ corruptor d1
d1 1 23 48
$ Walkers
Number of unreachable files: 7
1 24 80
1 25 32
1 26 48
1 27 48
1 28 32
1 29 48
1 30 32
```

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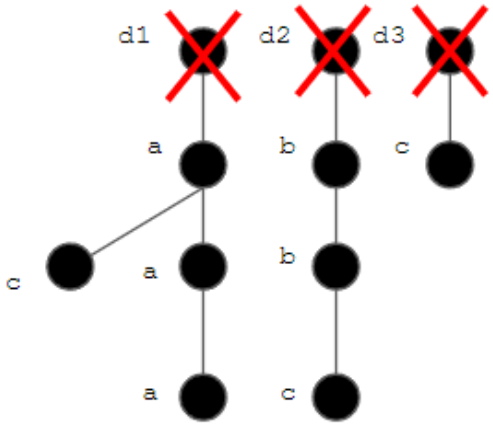
```
wc              2 16 17124
zombie          2 17 14940
directoryWalke  2 18 19084
inodeTBWalker   2 19 17300
Walkers         2 20 21588
corruptor       2 21 16256
console         3 22 0
lost+found-24   1 24 80
$
```

we can see that it found all 7 hanging directories, but when calling `ls`, it only places one of the nodes in the root directory as the other nodes resided under it. We can see this in `directoryWalker`

```
./wc 2 16 17124
./zombie 2 17 14940
./directoryWalke 2 18 19084
./inodeTBWalker 2 19 17300
./Walkers 2 20 21588
./corruptor 2 21 16256
./console 3 22 0
./lost+found-24 1 24 80
./lost+found-24/a 1 25 32
./lost+found-24/b 1 26 48
./lost+found-24/b/b 1 28 32
./lost+found-24/c 1 27 48
./lost+found-24/c/c 1 29 48
./lost+found-24/c/c/c 1 30 32
```

6. Multiple Trees

```
init: starting sh
$ mkdir d1 d1/a d1/a/a d1/a/a/a
$ mkdir d2 d2/b d2/b/b
$ mkdir d3
$ echo foo > d3/c
$ echo bar > d1/a/c
$ echo cat > d2/b/b/c
$ corruptor d1 d2 d3
d1 1 23 48
d2 1 27 48
d3 1 30 48
$ Walkers
Number of unreachable files: 8
1 24 64
1 25 48
1 26 32
1 28 48
1 29 48
2 31 4
2 32 4
2 33 4
$ ls
.              1 1 512
..             1 1 512
README         2 2 2286
cat            2 3 16392
echo           2 4 15244
forktest       2 5 9548
grep           2 6 18612
init           2 7 15832
kill           2 8 15272
ln             2 9 15124
ls             2 10 17764
mkdir          2 11 15372
rm             2 12 15348
sh             2 13 27984
stressfs       2 14 16260
usertests      2 15 67368
wc             2 16 17124
zombie         2 17 14940
directoryWalke 2 18 19084
inodeTBWalker  2 19 17300
Walkers        2 20 21588
corruptor      2 21 16256
console        3 22 0
lost+found-24  1 24 64
lost+found-28  1 28 48
lost+found-31  2 31 4
$
```



This time we make 3 different trees starting with `d1 d2` and `d2` then place some `c` files in them. We corrupt `d1 d2` and `d2` and their children files become unreachable. After running `Walkers`, it places the files in 3 `lost+found` directories. We demonstrate that the `c` files are still readable.

```
./lost+found-24 1 24 64
./lost+found-24/a 1 25 48
./lost+found-24/a/a 1 26 32
./lost+found-24/c 2 32 4
./lost+found-28 1 28 48
./lost+found-28/b 1 29 48
./lost+found-28/b/c 2 33 4
./lost+found-31 2 31 4
$ cat lost+found-24/c
bar
$ cat lost+found-28/b/c
cat
$ cat lost+found-31
foo
$
```