File systems

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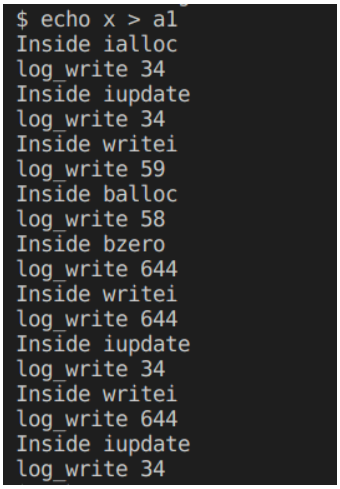
Part 1:

$ echo > a1

Output:

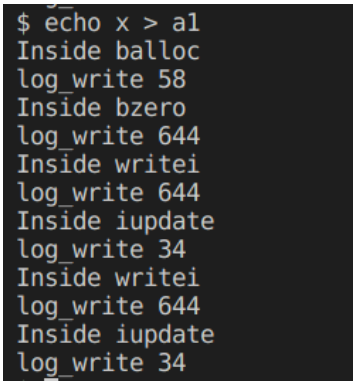


This command creates a new file a1 in the directory.

- To create a new file, an inode needs to be created, which is done by the `ialloc` function.
- `iupdate` function updates the inode.
- `iwrite` function writes data on the inode. In this case, null is written in a1.

$ echo x > a1

Output:



This command writes the data “x” inside a1

- `balloc` function allocates a new data block in the disk. It assigns the block 58 in the superblock to the file.
- `bzero` function zeros out the data present in the allocated block (block 644) so that new data can be written to the block.
- The data "x" is written to the block using `writei` function and the file (inode) is updated using `iupdate`.

$ echo xxx > a1

Output:

```
$ echo xxx > a1
Inside writei
log_write 644
Inside writei
log_write 644
Inside writei
log_write 644
Inside iupdate
log_write 34
Inside writei
log_write 644
Inside iupdate
log_write 34
```

This command writes the data "xxx" inside a1.

- In block 644, data is written one by one. Therefore, `writei` is called 3 times to write 3 x's in file
- File is updated.

$ rm a1

Output:

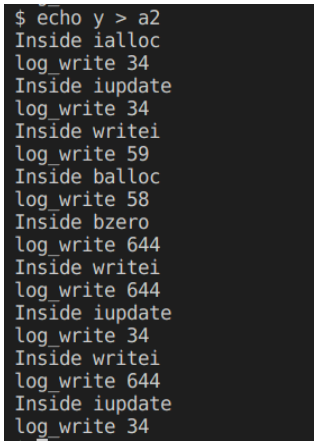
```
$ rm a1
Inside writei
log_write 59
Inside iupdate
log_write 34
Inside bfree
log_write 58
Inside iupdate
log_write 34
Inside iupdate
log_write 34
```

This command removes file a1 from the file system.

- The function `bfree` frees the data blocks allocated to the file a1.
- Updates are done after `bfree`.

$ echo y > a2

Output:



This command creates a new file a2 and writes the data “y” in the file.

- A new inode is created using the `ialloc` function.
- Data block is allocated and the data “y” is written on it using `writei` function.
- Inode is updated

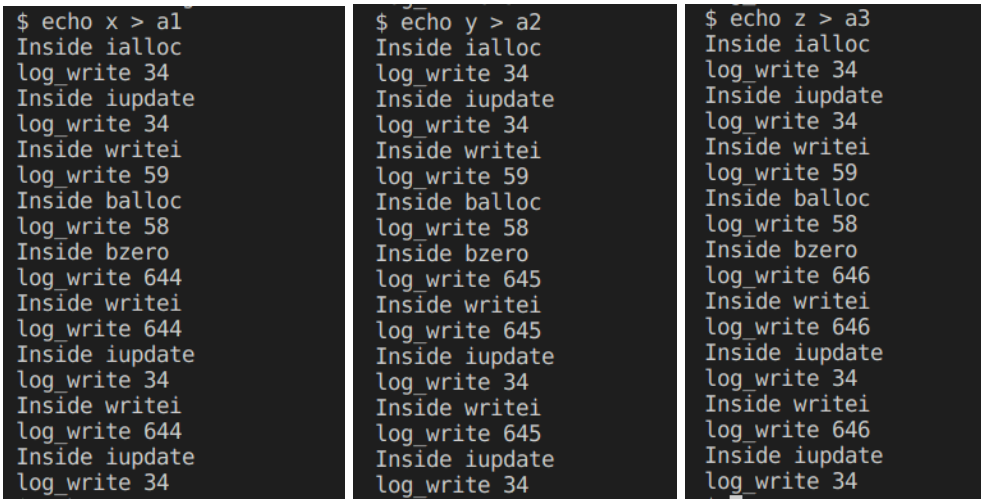
Part 2:

$ echo x > a1

$ echo y > a2

$ echo z > a3

Output:



- All inodes are allocated in the same block (34). This is because files are too small in size that they can be fitted in the same block.
- The data written in file i.e. “x”, “y” and “z” are written in different blocks (644, 645, 646).