File system

fd = open (“/usr/rtm/xv6/fs.c”, “w”)

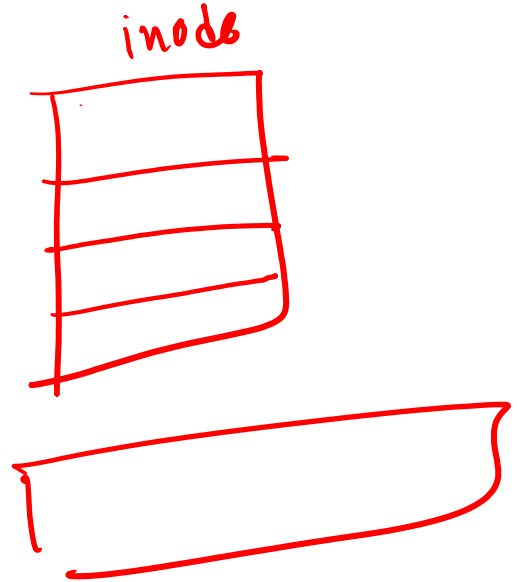
read (fd, buf, size);

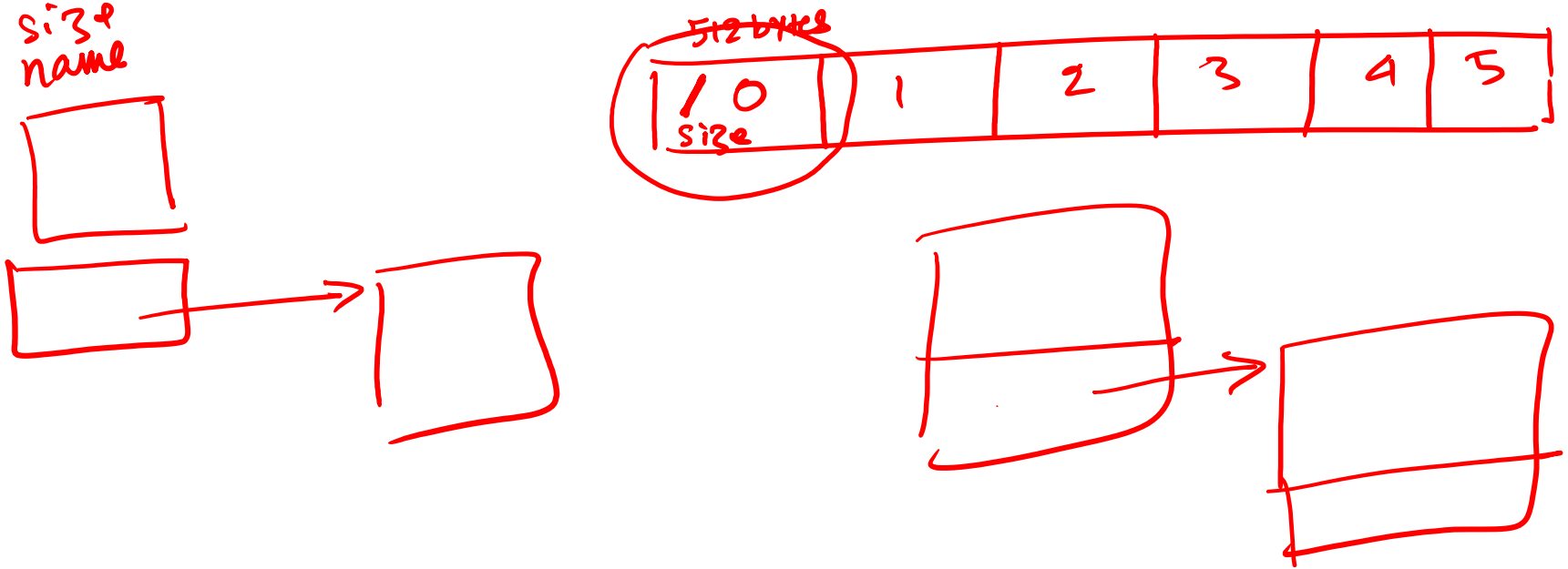
write (fd, buf, size);

close (fd);

Directories

- Directories are stored on disk sectors
- How to lookup “/usr/rtm/xv6/fs.c”



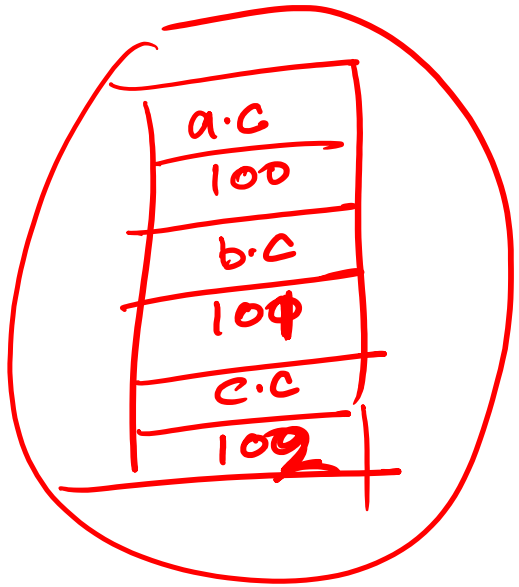


Directories

/

a.c
b.c
c.c

/a.c




```
struct inode {
  uint num_sectors;
  uint sectors[16];
};
```

```
lookup (filename)
{
  for(i=0; i<num_sectors; i++)
  {
    read(sectors[i], filename);
  }
}
```

Files

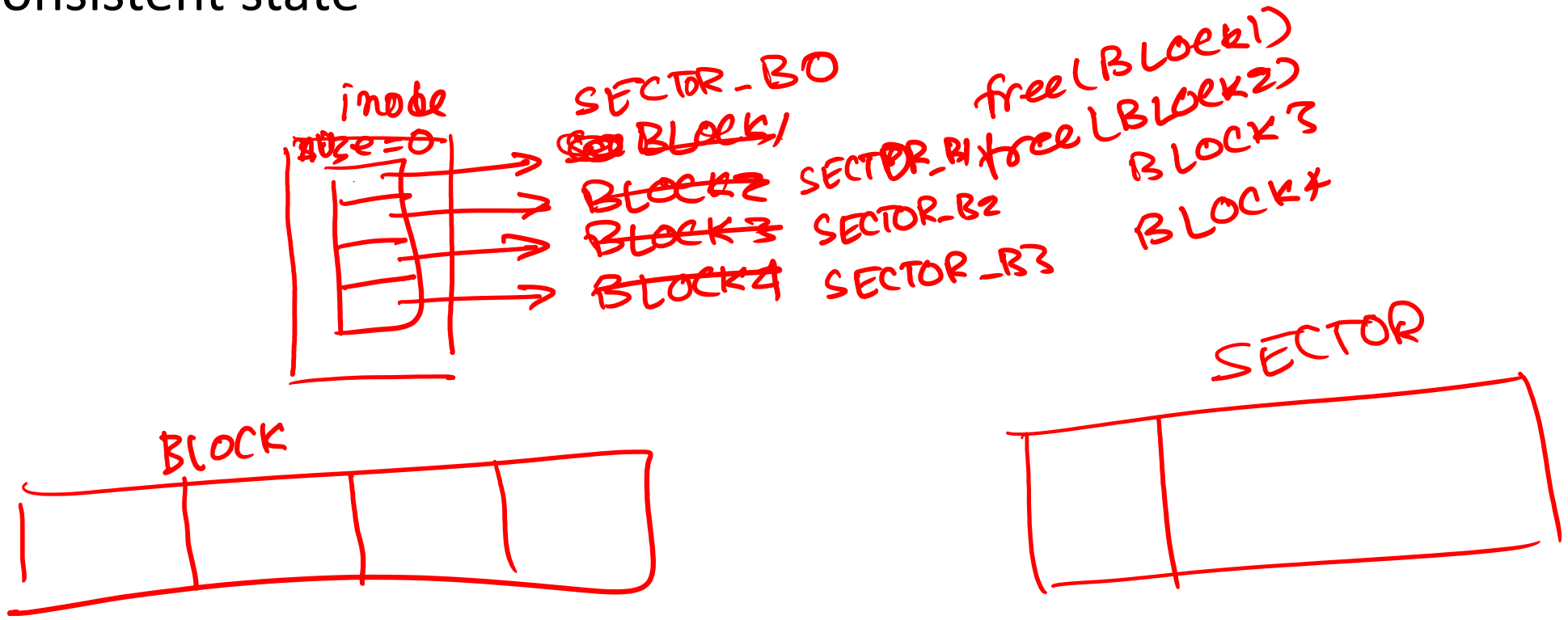
- Files are also stored on sectors
- Where to store the contents of the files?

Buffer cache

- Reading/writing to disk is slow
- Cache popular disk blocks so that they don’t need to be re-read from the disk
- Synchronize access to disk blocks

Crash recovery

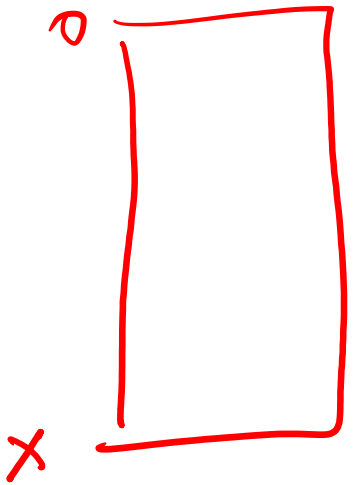
- What happens if a partial disk update leaves the file system in an inconsistent state



Crash recovery

- A file system must support some mechanism to recover from failures

- xv6 logging layer makes sure that a power failure does not leave the file system in an inconsistent state



Crash recovery

- First, make a copy in a temporary location (e.g., a log file)
- If the copy succeeds, then we can always recover from power failures by copying data from the log file to the original file