Team Atomic File System

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Github Link:
https://github.com/CSC415-2022-Fall/csc415-filesystem-Issashihadeh

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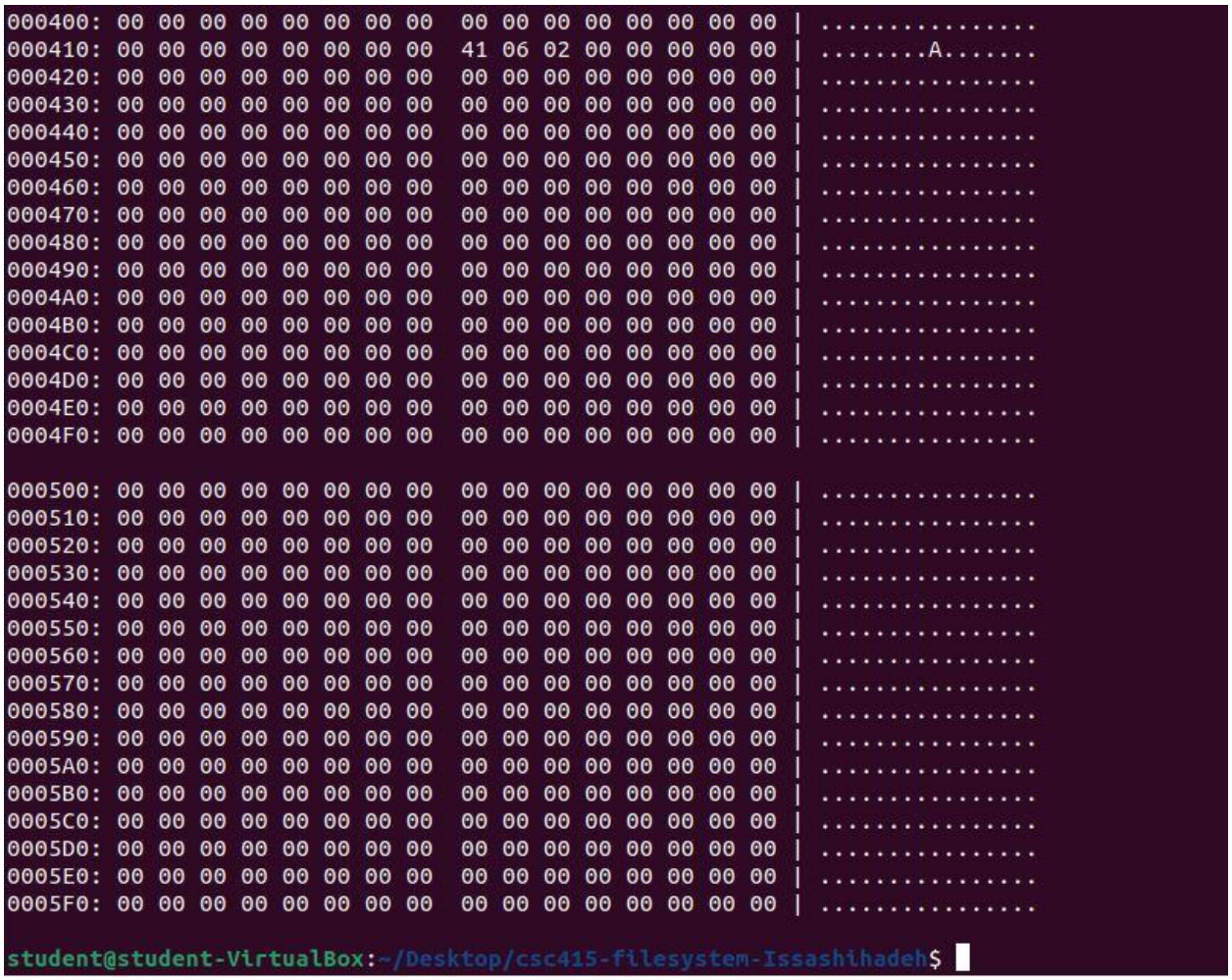
Hex Dump

```
student@student-VirtualBox:~/Desktop/csc415-filesystem-Issashihadeh$ Hexdump/hexdump.linux --start 1 --count 1 SampleVolume
Dumping file SampleVolume, starting at block 1 for 1 block:

000200: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000210: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000220: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000230: 00 00 00 00 00 00 00 00  21 00 00 00 00 00 00 00 | ........!.......
000240: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000250: 00 00 00 00 00 00 00 00  21 00 00 00 00 00 00 00 | ........!.......
000260: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000270: 00 00 00 00 00 00 00 00  61 06 02 00 00 00 00 00 | ........a.......
000280: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000290: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

000300: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000310: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000320: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000330: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000340: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000350: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000360: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000370: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000380: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000390: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

student@student-VirtualBox:~/Desktop/csc415-filesystem-Issashihadeh$
```

```
student@student-VirtualBox:~/Desktop/csc415-filesystem-Issashihadeh$ Hexdump/hexdump.linux --start 1 --count 2 SampleVolume
Dumping file SampleVolume, starting at block 1 for 2 blocks:

000200: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000210: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000220: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000230: 00 00 00 00 00 00 00 00  21 00 00 00 00 00 00 00 | ........!.......
000240: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000250: 00 00 00 00 00 00 00 00  21 00 00 00 00 00 00 00 | ........!.......
000260: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000270: 00 00 00 00 00 00 00 00  61 06 02 00 00 00 00 00 | ........a.......
000280: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000290: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0002F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

000300: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000310: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000320: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000330: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000340: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000350: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000360: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000370: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000380: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000390: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0003F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
```

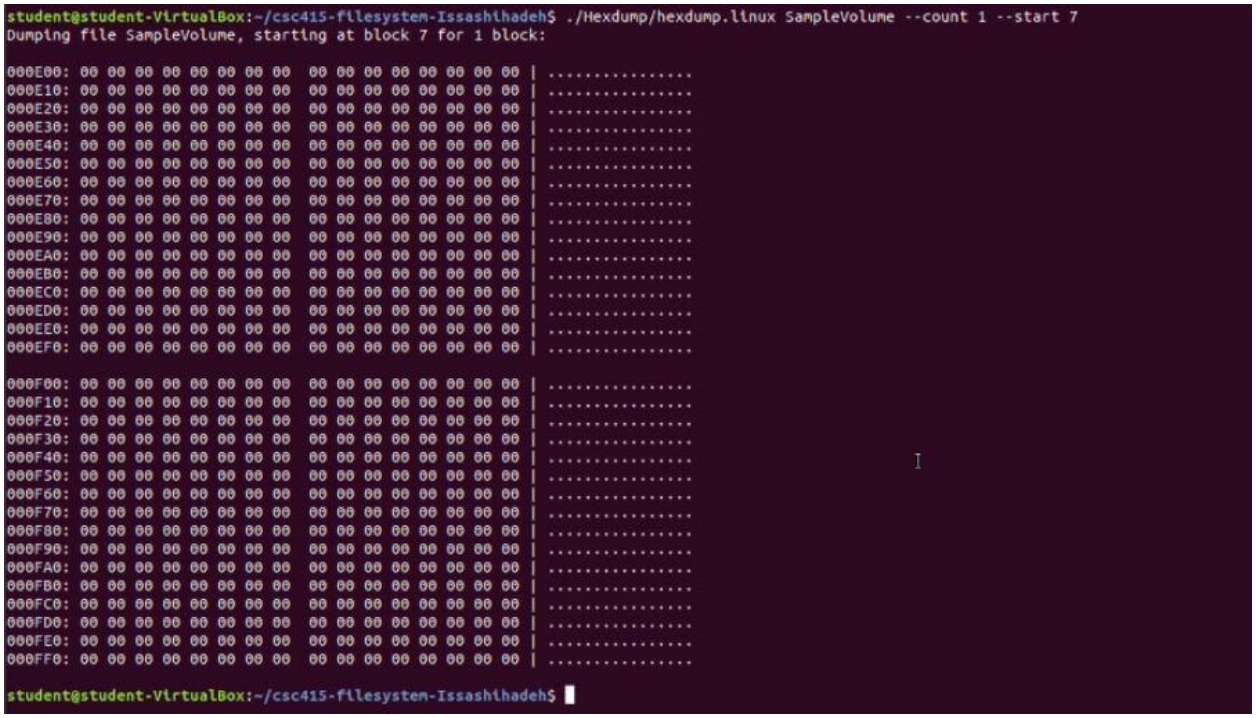

000400: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000410: 00 00 00 00 00 00 00 00 41 06 02 00 00 00 00 00 | ....A.......
000420: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000430: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000440: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000450: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000460: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000470: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000480: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000490: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0004A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0004B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0004C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0004D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0004E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0004F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000500: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000510: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000520: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000530: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000540: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000550: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000560: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000570: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000580: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000590: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0005A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0005B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0005C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0005D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0005E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
0005F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
student@student-VirtualBox:~/Desktop/csc415-filesystem-Issashihadeh$

```
student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$ ./Hexdump/hexdump.linux SampleVolume --count 1 --start 3
Dumping file SampleVolume, starting at block 3 for 1 block:

000600: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000610: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000620: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000630: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000640: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000650: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000660: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000670: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000680: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000690: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0006A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0006B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0006C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0006D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0006E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0006F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

000700: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000710: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000720: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000730: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000740: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000750: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000760: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000770: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000780: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000790: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0007A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0007B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0007C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0007D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0007E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0007F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$ ./Hexdump/hexdump.linux SampleVolu  t 1 --start 3
```

```
student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$ ./Hexdump/hexdump.linux SampleVolume --count 1 --start 4
Dumping file SampleVolume, starting at block 4 for 1 block:

000800: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000810: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000820: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000830: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000840: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000850: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000860: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000870: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000880: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000890: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0008A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0008B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0008C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0008D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0008E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0008F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

000900: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000910: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000920: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000930: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000940: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000950: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000960: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000970: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000980: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000990: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0009A0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0009B0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0009C0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0009D0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0009E0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
0009F0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$
```

```
student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$ ./Hexdump/hexdump.linux SampleVolume --count 1 --start 5
Dumping file SampleVolume, starting at block 5 for 1 block:

000A00: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A10: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A20: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A30: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A40: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A50: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A60: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A70: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A80: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000A90: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000AA0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000AB0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000AC0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000AD0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000AE0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000AF0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

000B00: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B10: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B20: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B30: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B40: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B50: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B60: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B70: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B80: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000B90: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000BA0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000BB0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000BC0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000BD0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000BE0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000BF0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$
```

```
student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$ ./Hexdump/hexdump.linux SampleVolume --count 1 --start 6
Dumping file SampleVolume, starting at block 6 for 1 block:

000C00: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C10: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C20: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C30: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C40: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C50: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C60: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C70: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C80: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000C90: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000CA0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000CB0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000CC0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000CD0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000CE0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000CF0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

000D00: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D10: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D20: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D30: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D40: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D50: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D60: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D70: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D80: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000D90: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000DA0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000DB0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000DC0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000DD0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000DE0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000DF0: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$
```


student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$ ./Hexdump/hexdump.linux SampleVolume --count 1 --start 7
Dumping file SampleVolume, starting at block 7 for 1 block:
000E00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E80: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000E90: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000EA0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000EB0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000EC0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000ED0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000EE0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000EF0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F80: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000F90: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000FA0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000FB0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000FC0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000FD0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000FE0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
000FF0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 | ....
student@student-VirtualBox:~/csc415-filesystem-Issashihadeh$

Volume Control Block Structure

```
typedef struct VCB{

        uint64_t blockSize;
        uint64_t numberOfBlocks;
        uint64_t startOfFSBlock;
        u_int8_t* startOfFreeSpace;
        uint64_t startOfRoot;
        uint64_t magicNumber;
        uint32_t mapBlocks;
        uint64_t freeLen;
        uint64_t freeMapAddress;
        uint64_t freeMap;
        uint64_t rootAddress;
        int dirLen;
        Entry *root;
        Entry *cwd;
        char* cwdName;

        uint64_t rootDirLoc;
}VCB;
```

The Parameters of our Volume Control Block Structure includes:

- The size of each block within the volume
- The number of blocks in the volume
- The first block within the free space map
- The beginning of the free space map
- The beginning of the root directory

- The signature of each file
- The number of blocks in the free space
- The length of the free space map
- The address of the free space map
- The bitmap being used for the free space
- The address for the root directory
- The length of the root directory
- The pointer representing the root directory
- The pointer representing the working directory
- The name of the working directory
- The location of the root directory

The volume control block is the container for all of the volume-specific data in the filesystem. It consists of the number of blocks in the volume and the size of each block, the signature (magic number) of the files, the pointer to the root directory, the bitmap that is meant to handle the free space, and etcetera. In addition, the parameters also include the beginning and the first block of the free space map along with the number of blocks in there and its address, the beginning, the address, the name and the length of the root directory, and the name and pointer of the working directory.

Free Space Management

In order to handle the free space of the filesystem, we had decided to use a bitmap, which uses a bit to represent every block in the filesystem. The bitmap represents free space with a ‘0’ and occupied space with a ‘1’. For the size of the bit vector, we used a size of 19,531 for the number of bits, which is equivalent to 2442 bytes or 5 blocks, as that is the amount of free space that we started off with. From there, we created a function named initFreeSpace() which handled initializing all of the bits in the bit vector. After which, everything else that was done involving the free space was taken care of with the initFileSystem() function, which starts up the rest of the capabilities for the filesystem. The idea behind the initialization of the free space is so that the filesystem can be able to tell the difference between space that is free and space that is already occupied by another block of data.

Directory System

```
typedef struct Entry {
        uint64_t id;
        uint64_t location;
        uint64_t count;
        uint64_t metadata;
}Entry;
```

The Parameters of our Directory Entry Structure includes:

- The name or identifier of the entry
- The location of the entry within the directory
- The size of the directory entry
- The type of data contained within the entry

The directory implemented by the filesystem is created by using the same system that also creates the root directory. Once the root directory is created, each of the directory entries are assigned values to each of their parameters which symbolized their characteristics, which are the entry identifier, its location within the directory, the size of each entry, and the metadata, which is the type of data that is stored within the entry. And each directory entry is represented via the private struct above.

File Systems Functionality

Given our circumstances, we tried our best to implement all the functionalities for this project. However, we don't have any screenshots to share, because none of them work properly. We spent a lot of time trying to get everything initialized, and ran into so many different problems. Mainly, we had a lot of problems with allocating space for this properly, which impacted our functions. We had fixed our segmentation faults in the previous milestone, but have run into them again. This additionally makes it so we couldn't test our functionality

Division Of Work

Working Together:

When it came to working together, it wasn't easy as the project was time-consuming and it took a while to get the file system functioning properly. We tried to split the work evenly as we could, however we did tend to have some problems with scheduling meetings and we did have some issues with people not contributing and that would lead to other members having a lot more work to do. We eventually had one person ghost us for the rest of the project.

Meeting Frequency:

Originally, our group would meet two times a week and each meeting would last for approximately 20 to 30 minutes. However, as the semester went on and we spent more and more time on this project, it would require us to meet with each other as much as possible and our meeting times would then extend from 30 minutes to an hour. When we discuss our project, we would try to go about the best way to approach things such as taking care of the free space and the root directory. For example, one thing we would discuss is how to properly handle the hexdump when dealing with milestone 1 and getting it to work when initializing the filesystem.

Meeting Method:

Our primary method of communication for this project is through the use of Discord. When we use Discord, we utilize both voice chat whenever we have group meetings as well as the general text channels. With that, we would be able to share any updates we had such as output errors, compilation errors, and we would advise on the next step.

Task Division:

Component	Team Member(s)
Dump	Issa, Alexander
VCB Structure	Issa, Elias, Alexander
Free Space Structure	Issa, Alexander
Directory System	Issa, Alexander
File System Functionalities	Issa, Alexander

Issues and Resolutions

1. The first problem that we had encountered was related to populating the hexdump. Through a lot of trial and error, we found out that the problem was a couple syntax issues in the fsInit.c file that we had created. Once we had fixed this issue, we were able to see that things were writing to disk properly.

2. Another problem that we had with this assignment is understanding how to get the signature to work right. We pretty quickly resolved this issue by going over lecture material and planning it out. The strategy for implementing this was quite simple after we did some research on it.

3. Initially, we all tried to work on the assignment from different angles. We understood pretty quickly that a team assignment requires planning of what we might do and how to do it. We spent a good amount of time planning how we would initialize the free space and the directory. We found that reviewing lecture videos made it more clear as to how we might attack this milestone.

4. One small problem or dilemma that we faced in this milestone was whether to put things in their own designated files. We decided that for this milestone it would matter too much because we didn't write that much code. However, for the next milestone, we have decided that we will put things in their own files to make the fsinit.c file cleaner.

5. One thing that was a continuing issue within our code was that in the process of compilation, we would receive errors that would state we have undefined references to specific functions. Examples include “undefined reference to createDir()” and “undefined reference to setBit()”. However, we were able to figure out that we were missing the required header and c files.

6. Another ongoing issue we've been having was the handling of the file system operations, such as opendir, readdir, closedir, and etcetera. We have been continuously testing the different functions that control the different capabilities of the filesystem. There are still some bugs that we are still experiencing at the moment, so we are still looking for a resolution for this problem.