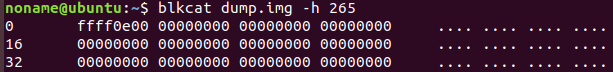
1. Fsstat dump.img

|  |
| --- |
| FILE SYSTEM INFORMATION  --------------------------------------------  File System Type: Ext4  …  InCompat Features: Filetype, Needs Recovery, Extents, 64bit, Flexible Block Groups,  …  METADATA INFORMATION  --------------------------------------------  Inode Range: 1 - 126977  Root Directory: 2  Free Inodes: 126965  Inode Size: 256  CONTENT INFORMATION  --------------------------------------------  Block Groups Per Flex Group: 16  Block Range: 0 - 507618  Block Size: 4096  Free Blocks: 489959  BLOCK GROUP INFORMATION  --------------------------------------------  Number of Block Groups: 16  Inodes per group: 7936  Blocks per group: 32768  Group: 0:  Block Group Flags: [INODE\_ZEROED, ]  Inode Range: 1 - 7936  Block Range: 0 - 32767  Layout:  Super Block: 0 - 0  Group Descriptor Table: 1 - 1  Group Descriptor Growth Blocks: 2 - 248  Data bitmap: 249 - 249  Inode bitmap: 265 - 265  Inode Table: 281 - 776  Uninit Data Bitmaps: 249 - 264  Uninit Inode Bitmaps: 265 - 280  Uninit Inode Table: 281 - 8216  Data Blocks: 8217 - 32767  Free Inodes: 7925 (99%)  Free Blocks: 24545 (74%)  Total Directories: 2  Stored Checksum: 0x9027  … |

\*\*\* 첫번째 Inode table의 블럭번호[0x08] = 0x0119 = 281

|  |
| --- |
| inode가 256 bytes -> 4K 블록당 16개의 inode가 존재  블록 그룹 당 7936개의 아이노드 -> 7936/16=496개  Inode Table: 281 - 776 -> 776-280 : 496개 |

\*\*\* Inode bitmap



0x0e ffff = 1110 1111 1111 1111 1111 (2)

|  |
| --- |
| 0 b481e803 00000000 828e905d 968e905d .... .... ...] ...] // i\_mode = 0x81b4  16 828e905d 968e905d e8030000 00000000 ...] ...] .... ....  32 00000800 01000000 0af30000 04000000 .... .... .... .... // extent header  48 00000000 00000000 00000000 00000000 .... .... .... ....  64 00000000 00000000 00000000 00000000 .... .... .... ....  80 00000000 00000000 00000000 00000000 .... .... .... ....  96 00000000 2dcf08d1 00000000 00000000 .... -... .... ....  112 00000000 00000000 00000000 70420000 .... .... .... pB..  128 20003169 fcf50915 54ebc1e6 54ebc1e6 .1i .... T... T...  144 828e905d 54ebc1e6 00000000 00000000 ...] T... .... ....  160 00000000 00000000 00000000 00000000 .... .... .... ....  176 00000000 00000000 00000000 00000000 .... .... .... ....  192 00000000 00000000 00000000 00000000 .... .... .... ....  208 00000000 00000000 00000000 00000000 .... .... .... ....  224 00000000 00000000 00000000 00000000 .... .... .... ....  240 00000000 00000000 00000000 00000000 .... .... .... .... |
| i\_mode  0x8000 : regular file  0x100 : S\_IRUSR (Owner may read)  0x4 : S\_IROTH (Others may read)  extent header = EXT4는 블록 포인터 대신 extent를 사용하기 때문에 기존의 블록 포인터를 담기 위해 사용됐던 40-99까지의 60bytes를 현재는 extent 정보를 담는데 사용된다.  Bytes 52-55: Logical block number (0x0000)  56-57: Number of blocks in extent (0x0000)  58-59: Upper 16 bits of physical block address (0x0000)  60-63: Lower 32 bits of physical block address (0x00000000)  즉 inode에는 삭제된 파일에 대한 정보가 남아있지 않다. |

참고

<https://charsyam.wordpress.com/2018/12/15/%EC%9E%85-%EA%B0%9C%EB%B0%9C-ext4-%EC%97%90%EC%84%9C-%EB%8B%AC%EB%9D%BC%EC%A7%84-%EB%B6%80%EB%B6%84%EB%93%A4-1/>

위 주소에서 block group과 flexible block group의 차이를 잘 알 수 있다.

<https://rrhh234cm.tistory.com/184>

super block과 GDT의 그림

<https://ext4.wiki.kernel.org/index.php/Ext4_Disk_Layout#Inode_Table>

superblock과 GDT 비트

<https://ext4.wiki.kernel.org/index.php/Ext4_Disk_Layout#Block_and_inode_Bitmaps>

inode 비트들