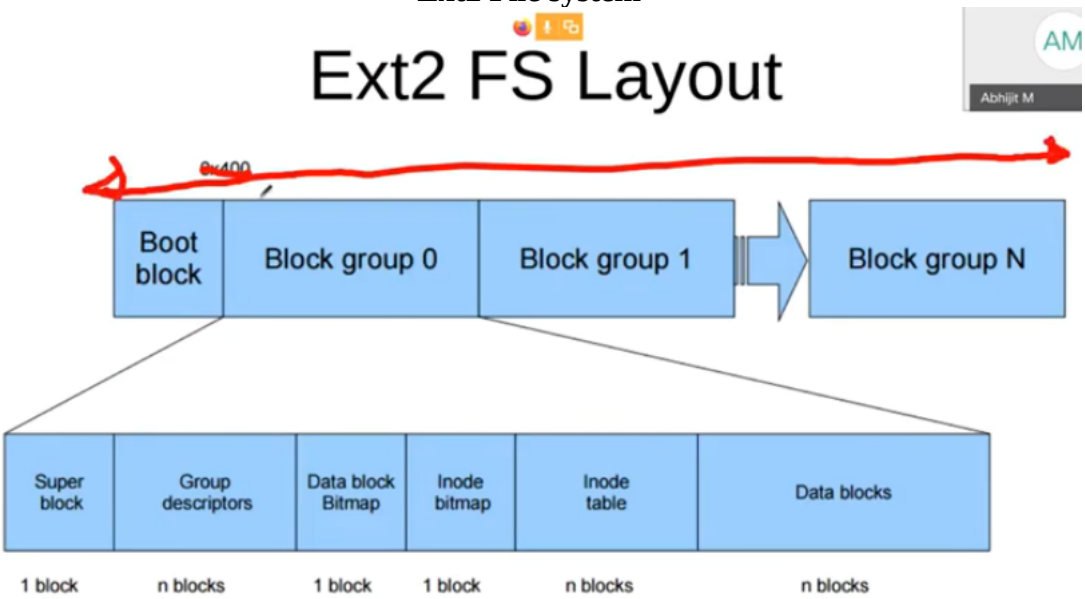
Ext2 File system



f

By default : block size : 4k
super block : 4k reserved
group descriptor : variable – array of group descriptor. Stores info about grp which it is in.
Inode table : reserved sequentially storing all inodes of all files.
4K*100 / 128 byte
Data block : where actual files data is stored
data block bitmap : out of all block which are allocated.
Inode bitmap : out of inode which are used

inode size : 128
blocks = 100
block size = 4k
total size = 100*4k
inodes = 100*4k/128
no of bit needed for inode = 8
inode bitmap = 100*4k/(128*8)
blocks needed for inode bitmap = 100*4k/(128*8*4k)

Directory is also file: it contains list of files or sub dir.

if we want to /x/y
first go inode entry of / in inode table
it will have a entry of x (inode number) in its data table.
Again go to inode table in inode number of x
then willl fetch data of x from data block.
Search for y : will give inode
then again to inode table
then get data block of the y

Superblock:

```
struct ext2_super_block {
    __le32  s_inodes_count;     /* Inodes count */
    __le32  s_blocks_count;     /* Blocks count */
    __le32  s_r_blocks_count;   /* Reserved blocks count */
    __le32  s_free_blocks_count;    /* Free blocks count */
    __le32  s_free_inodes_count;    /* Free inodes count */
    __le32  s_first_data_block; /* First Data Block */
    __le32  s_log_block_size;   /* Block size */
    __le32  s_log_frag_size;    /* Fragment size */
    __le32  s_blocks_per_group; /* # Blocks per group */
    __le32  s_frags_per_group;  /* # Fragments per group */
    __le32  s_inodes_per_group; /* # Inodes per group */
    __le32  s_mtime;        /* Mount time */
    __le32  s_wtime;        /* Write time */
    __le16  s_mnt_count;        /* Mount count */
    __le16  s_max_mnt_count;    /* Maximal mount count */
    __le16  s_magic;        /* Magic signature */
    __le16  s_state;        /* File system state */
    __le16  s_errors;       /* Behaviour when detecting errors */
```

summary of entire FS.present in all Block groups.
Group descriptor : in all block groups

Super blocks : gives total counts of inodes there.

4kb block size : block group will have 32 k blocks

let total number of partition = 32 million
total number of block groups = 32 million / 32k = 1000

these group will need some blocks to store in group descriptor

out of remaining how many will be in inode table and data block.

Now in inode bitmap, as it only one block, it can address 32k bits
thus will have max of 32k inodes.

```
struct ext2_group_desc
{
    __le32  bg_block_bitmap;        /* Blocks bitmap block */
    __le32  bg_inode_bitmap;        /* Inodes bitmap block */
    __le32  bg_inode_table;     /* Inodes table block */
    __le16  bg_free_blocks_count;   /* Free blocks count */
    __le16  bg_free_inodes_count;   /* Free inodes count */
    __le16  bg_used_dirs_count; /* Directories count */
    __le16  bg_pad;
    __le32  bg_reserved[3];
};
```

```
struct ext2_inode {
    __le16  i_mode;    /* File mode */
    __le16  i_uid;     /* Low 16 bits of Owner Uid */
    __le32  i_size;    /* Size in bytes */
    __le32  i_atime;   /* Access time */
    __le32  i_ctime;   /* Creation time */
    __le32  i_mtime;   /* Modification time */
    __le32  i_dtime;   /* Deletion Time */
    __le16  i_gid;     /* Low 16 bits of Group Id */
    __le16  i_links_count;  /* Links count */
    __le32  i_blocks;  /* Blocks count */
    __le32  i_flags;   /* File flags */
```


Ext2 FS layout : Directory Entry

```
1 print the inode of a file, whose name is specified.
2
3 E.g file name is /x/y/m.c
4
5 Read superblock -> block size,
6 Read group descriptors -> inode table block number
7 REPEAT:
8 That the inode number of "/" is 2
9 Go to offset 2*sizeof(inode) + sizeofblock*inode-table-block-number from beginning of /dev/sdd1
10 Read ext2_inode
11 From this inode, get block numbers using inode.ext2_blocks[] array
12 Now seek to those blocks using block_no * block_size offset
13 read each block
14 interpret each block to contain directory data  ----4binode-2b reclen--1b type--1bnamelen --name--4b inode ---
15 Get the entry for "x" and inode number
16 go to REEPAT with inode number =  inode number of x
```