操作系统 Operating Systems

L32 目录解析代码实现

Directory Resolution

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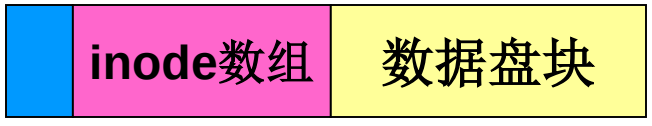
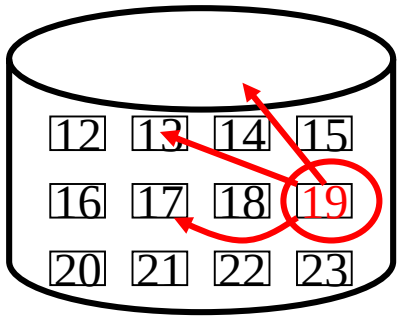
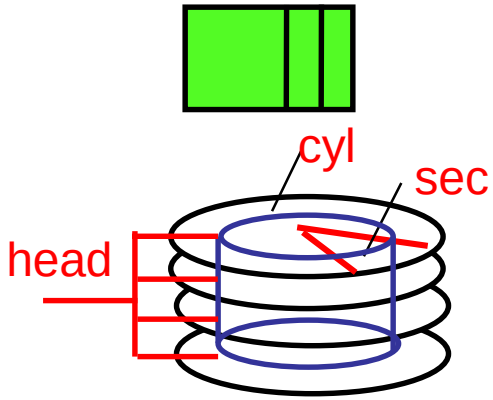
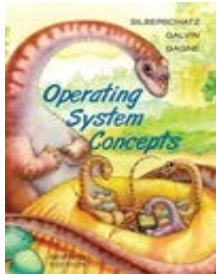
“完成全部映射下”的磁盘使用

用户	读test.c 202-212个字节
open(/xx/test.c)	目录解析找到/，读入/内容找到xx，再找到test.c的inode
read(fd)	根据找到的FCB和file中的202-212字节找盘块789
写入电梯队列	add_request(789)
磁盘中断	从队列中取出789，算出cyl,head,sector
写磁盘控制器	outp(cyl,head,sector)

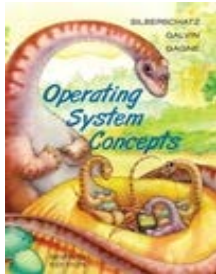




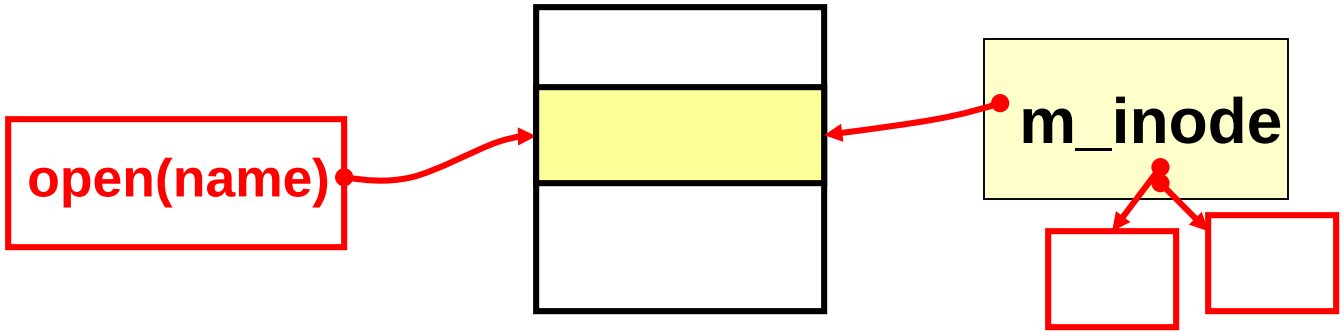




一个实际运转的文件系统!



就是将open弄明白...



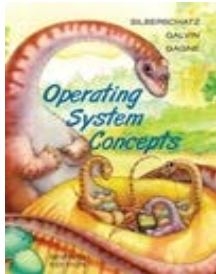
在linux/fs/open.c中

```
int sys_open(const char* filename, int flag)
{  i=open_namei(filename,flag,&inode);
   ... }
```

解析路径!

```
int open_namei(...)
{  dir=dir_namei(pathname,&namelen,&basename);
```

```
static struct m_inode *dir_namei()
{  dir=get_dir(pathname); }
```



get_dir完成真正的目录解析

```
static struct m_inode *get_dir(const char *pathname)
{ if((c=get_fs_byte(pathname))=='/')
    {inode=current->root; pathname++;}
  else if(c) inode=current->pwd;
  while(1){if(!c) return inode;  //函数的正确出口
    bh=find_entry(&inode,thisname,namelen,&de);
    int inr=de->inode; int idev=inode->i_dev;
    inode=iget(idev,inr); //根据目录项读取下一层inode}}
```

解析从此处开始!

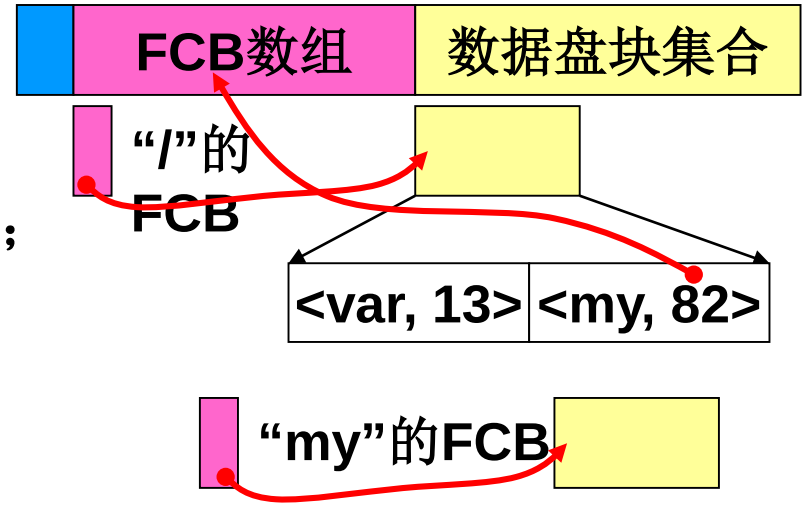
- 核心的四句话正好对应目录树的四个

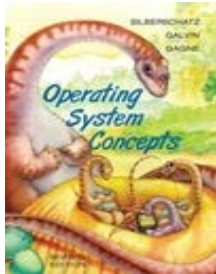
  重点：(1)root：找到根目录；

  (2)find_entry：从目录中读取目录项；

  (3)inr：是目录项中的索引节点号；

  (4)iget：再读下一层目录





目录解析 — 从根目录开始

```
inode=current->root;
```

- 又是current(task_struct)，仍然是拷贝自init进程

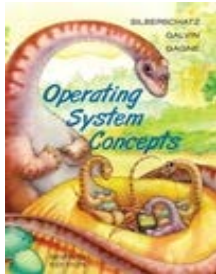
```
void init(void)
{  setup((void *) &drive_info); ...
```

一句看过无数次，又略过无数次的语句

```
sys_setup(void * BIOS)//在kernel/hd.c中
{  hd_info[drive].head = *(2+BIOS);
   hd_info[drive].sect = *(14+BIOS);
   mount_root(); ... }
```

```
void mount_root(void)//在fs/super.c中
{
   mi=iget(ROOT_DEV,ROOT_INO));
   current->root = mi;
}
```

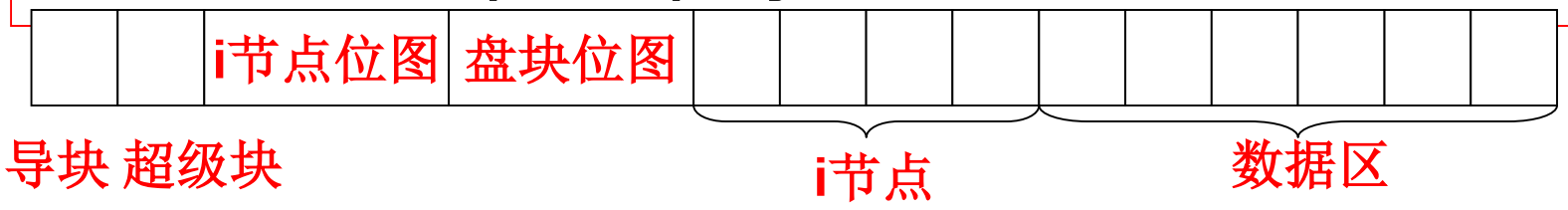
```
#define ROOT_INO 1
```

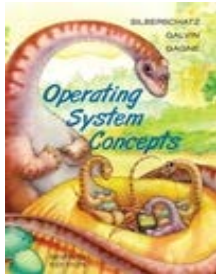


读取inode — iget

```
struct m_inode * iget(int dev, int nr)
{  struct m_inode *inode = get_empty_inode();
   inode->i_dev=dev; inode->i_num=nr;
   read_inode(inode); return inode;}
```

```
static void read_inode(struct m_inode *inode)
{ struct super_block *sb=get_super(inode->i_dev);;
  lock_inode(inode);
  block=2+sb->s_imap_blocks+sb->s_zmap_blocks+
        (inode->i_num-1)/INODES_PER_BLOCK;
  bh=bread(inode->i_dev,block);
  inode=bh->data[(inode->i_num-1)%INODES_PER_BLOCK];
  unlock_inode(inode); }
```





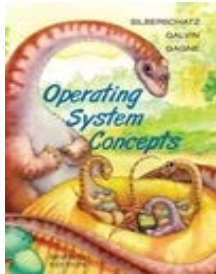
开始目录解析 — find_entry(&inode,name,...,&de)

- de: directory entry(目录项)

```
struct dir_entry{
  unsigned short inode; //i节点号
  char name[NAME_LEN]; //文件名 }
```

```
#define NAME_LEN 14
```

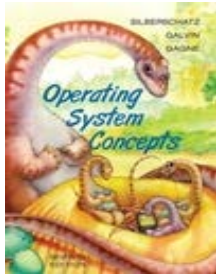
```
在fs/namei.c中
static struct buffer_head *find_entry(struct m_inode
**dir, char *name, ..., struct dir_entry ** res_dir)
{ int entries=(*dir)->i_size/(sizeof(struct dir_entry));
  int block=(*dir)->i_zone[0];
  *bh=bread((*dir)->i_dev, block);
  struct dir_entry *de =bh->b_data;
  while(i<entries) {
    if(match(namelen,name,de))
    {*res_dir=de; return bh;}de++; i++;} }
```



while(i<entries)…

```
while(i<entries) //entries是目录项数
{ if((char*)de> = BLOCK_SIZE+bh->
        brelse(bh);
        block=bmap(*dir,i/DIR_ENTRIES_PER_BLOCK);
        bh=bread((*dir)->i_dev,block);
        de=(struct dir_entry*)bh->b_data;
   } //读入下一块上的目录项继续match
   if(match(namelen,name,de))
   {*res_dir=de;return bh;}
 de++; i++; }
```

#define BLOCK_SIZE 1024 //两个扇区



操作系统全图