

第十章 文件系统接口

1. Consider a file system where a file can be deleted and its disk space reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided?

2. The open-file table is used to maintain information about files that are currently open. Should the operating system maintain a separate table for each user or just maintain one table that contains references to files that are being accessed by all users at the current time? If the same file is being accessed by two different programs or users, should there be separate entries in the open file table?

3. What are the advantages and disadvantages of a system providing mandatory locks instead of providing advisory locks whose usage is left to the users' discretion?

4. Discuss the merits and demerits of supporting links to files that cross mount points (that is, the file link refers to a file that is stored in a different volume).

1. 会产生悬空指针, 由于文件在链接存在时, 就删除回收空间, 那些剩余的链接指向被回收的空间, 若新文件使用同存储区域或相同绝对路径名, 旧链接就会错误指向新文件或无效数据, 导致异常。

避免问题的方法: 采用引用计数机制。为每一个文件维护“被链接的次数”: 创建硬链接时, 计数加1; 删除时, 减1, 当计数为0时, 才真正删除文件并回收磁盘空间。

2. 只维护一个包含所有用户访问文件的表。当首次访问某文件时, 将其添加在打开文件表中, 后面的进程在访问该文件时通过表中条目指定文件。同样只有在所有进程都不在使用该文件时才将其从系统文件表中删除。

如果两个进程正在访问该文件, 则需要维护单独的状态, 以跟踪两个进程正在访问文件的哪些部分的当前位置, 需要为两个进程维护单独的条目。

3.

优点：强制阻止其他进程访问已加锁的文件，保证互斥，减少意外故障。

缺点：降低了系统的并行性，系统性能开销增加，灵活性大幅降低。

4.

优点：

① 访问与组织更灵活

② 节省存储空间，无需将文件复制到同一卷，仅通过链接。

缺点：

① 链接易失败，如果目标卷未挂载、目标文件被移动，则导致链接变成“悬空链接”，无法访问。

② 性能与管理成本高