## 操作系统

## 第九次作业

10.1  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?

**在该文件系统中，文件A被删除时，空间被释放而链接仍存在。若创建了一个与被删除文件A具有相同的绝对路径和存储位置的文件B，则可能出现的问题是：当用户试图通过链接访问文件A时，不能访问到文件A也不会被提示文件已删除，而会访问到文件B。**

**可以通过以下方法避免该问题：**

**在系统中存储和维护文件的链接列表，当文件被删除时，删除该文件的所有链接。或仅当文件的链接全部被删除时，才删除文件并释放文件所占用的空间。**

11.1  Consider a file system that uses a modified contiguous-allocation scheme with support for extents. A file is a collection of extents, with each extent corresponding to a contiguous set of blocks. A key issue in such system is the degree of variability in the size of the extents. What are the advantages and disadvantages of the following schemes?

1. All extents are of the same size, and the size is predetermined.
2. Extents can be of any size and are allocated dynamically.
3. Extents can be of a few fixed sizes, and these sizes are predetermined.

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|  | **Advantages** | **Disadvantages** |
| **a.** | **分配速度快且简单，不会产生外碎片** | **可能产生内碎片，分配不灵活** |
| **b.** | **分配灵活，不会产生内碎片** | **可能产生外碎片，但复杂速度慢** |
| **c.** | **介于a.与b.之间，不会产生外碎片，且比a.内碎片更少** | |

11.2  What are the advantages of the variant of linked allocation that uses a FAT to chain together the blocks of a file?

**利用FAT的链式结构可以提高磁盘空间利用率，不会产生外碎片，且方便文件插入和删除，有利于文件动态扩充。同时，FAT可以被缓存至内存中，在访问文件中间的块时，直接寻找内存缓存中的指针，快速直接存取。**

11.3  Consider a system where free space is kept in a free-space list.

1. Consider a file system similar to the one used by UNIX with indexed allocation. How many disk I/O operations might be required to read the contents of a small local file at /a/b/c? Assume that none of the disk blocks is currently being cached.
2. Suggest a scheme to ensure that the pointer to the free space list is never lost as a result of memory failure.
3. **读取本地小文件 /a/b/c 需要4个磁盘I/O操作：**

**读取根目录 / 的磁盘块以找到目录 /a 的磁盘块；**

**读取 /a 的磁盘块以找到目录 /a/b 的磁盘块；**

**读取 /a/b 的磁盘块以找到文件 /a/b/c 所在的磁盘块；**

**读取 /a/b/c 磁盘块上的小文件；**

1. **将空闲空间列表的指针存储在磁盘中，并为之建立备份。**