操作系统

Operating system

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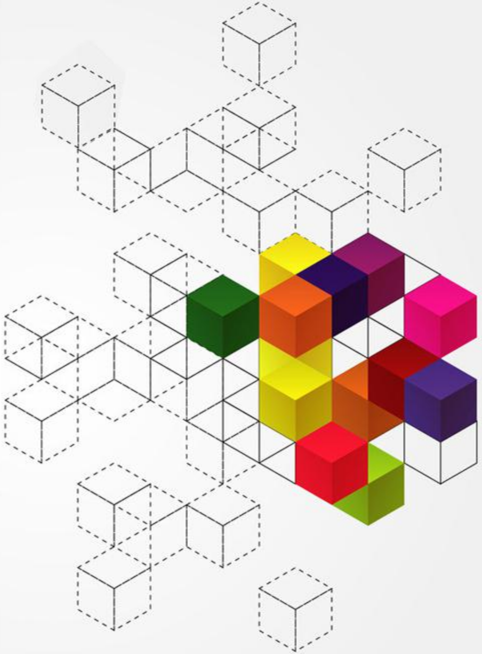
内容纲要　　11.3 目录实现

一、 目录与文件按名存取

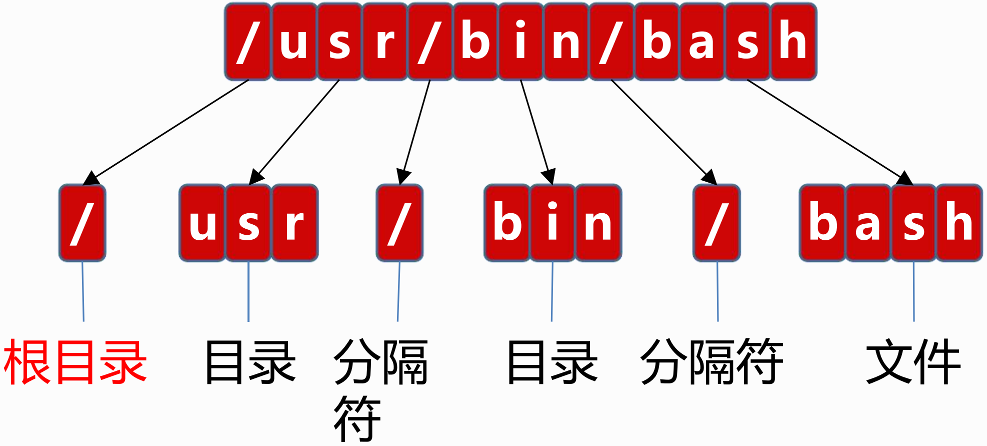
二、 目录数据结构

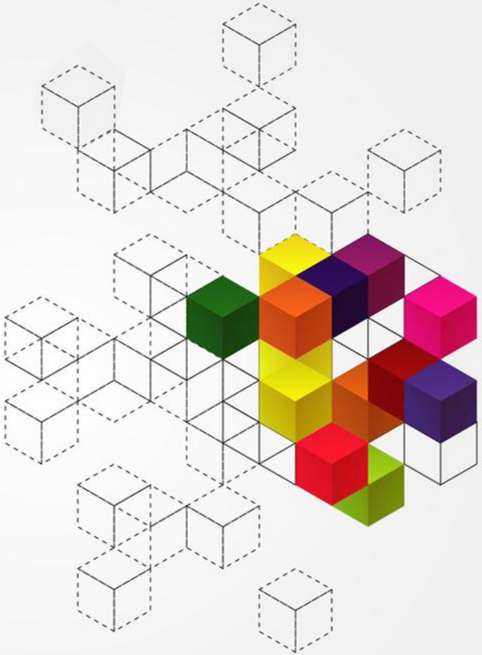
directory-management algorithms significantly affects efficiency, performance, and reliability of a file system



一、目录与文件按名存取

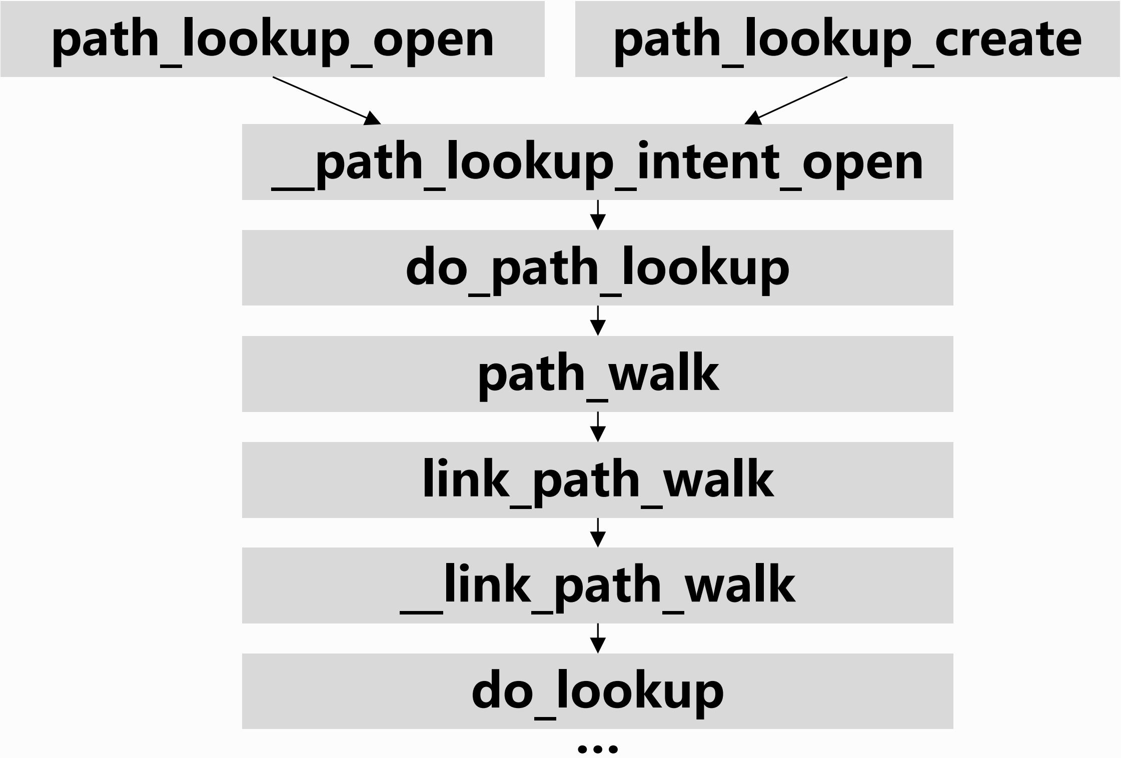
- **文件路径名解析**
  - 文件路径名解析在文件open等操作中经常被使用，很重要
  - 路径名解析的目的：根据文件路径，找到对应文件控制块
  - 做法：解构路径名，将其拆分成一级一级的目录名及最后一级的文件名





一、目录与文件按名存取

- **文件路径名解析**
  - Linux中解析代码的函数调用序列



path_lookup_open

path_lookup_create

__path_lookup_intent_open

do_path_lookup

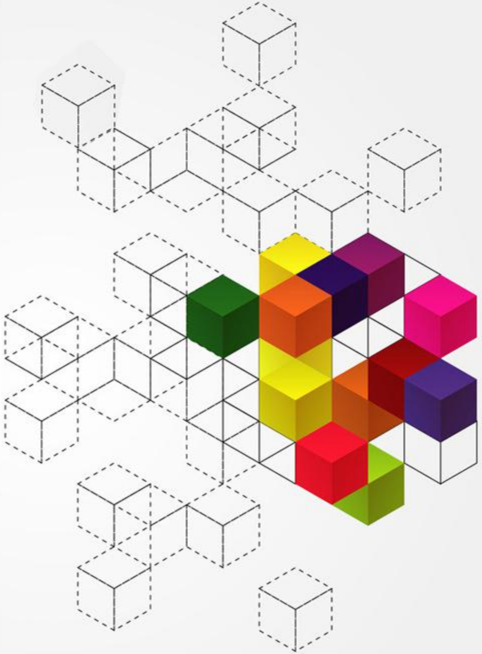
path_walk

link_path_walk

__link_path_walk

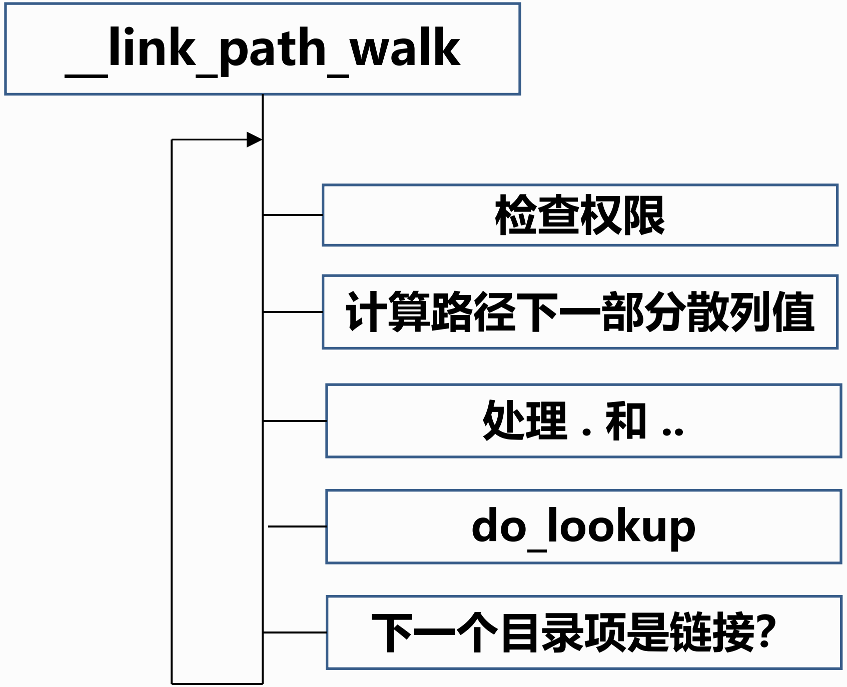
do_lookup

…



一、目录与文件按名存取

- Linux文件遍历实现：__link_path_walk()



__link_path_walk

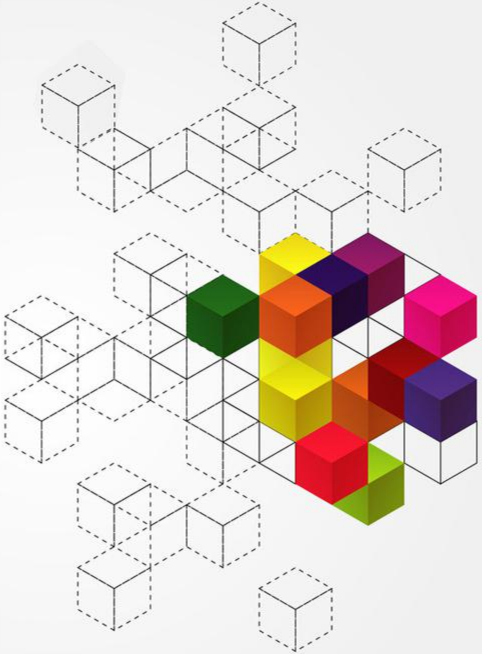
检查权限

计算路径下一部分散列值

处理 . 和 ..

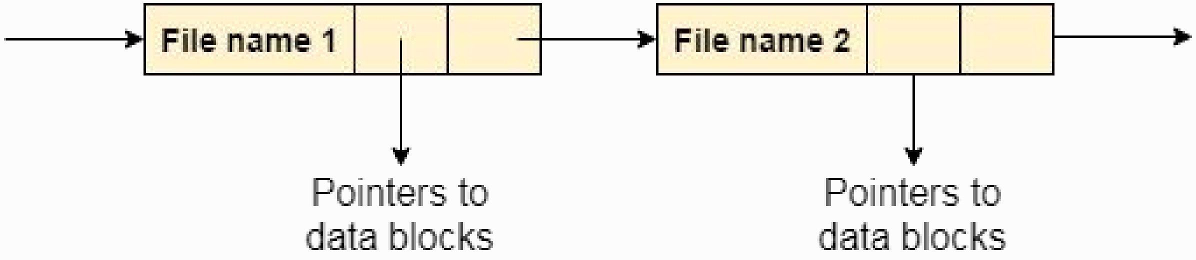
do_lookup

下一个目录项是链接?



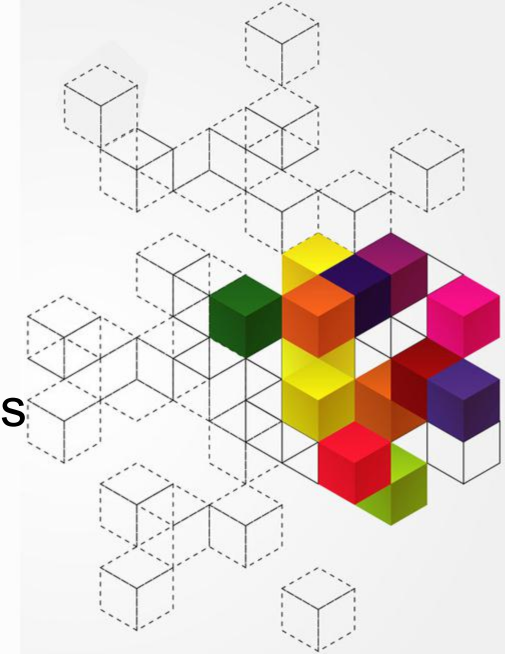
二、目录数据结构

• 目录结构1：线性表



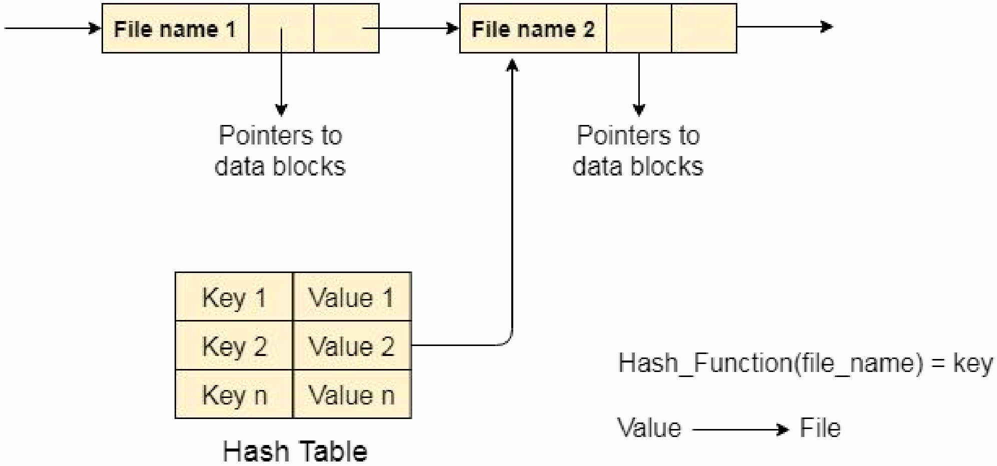
Linear List

- **Linear list** of file names with pointer to the data blocks
  - **Simple to program**
  - **Time-consuming to execute**
    - **Linear search time (for a file name)**
    - **Could keep ordered alphabetically via linked list**



二、目录数据结构

• 目录结构2：哈希表

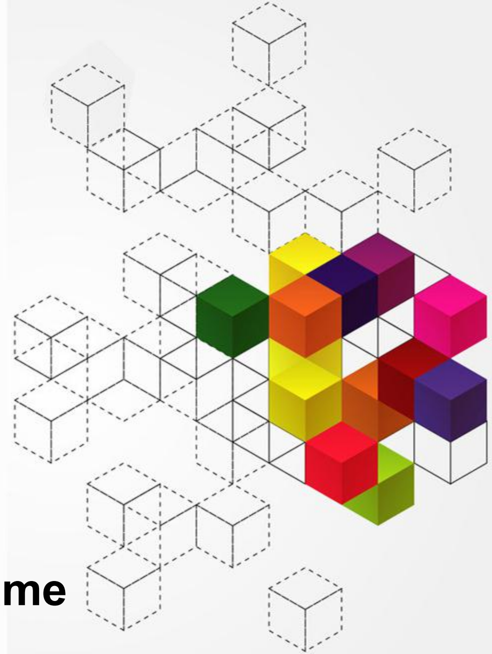


Key 1	Value 1
Key 2	Value 2
Key n	Value n

Hash Table

Hash_Function(file_name) = key

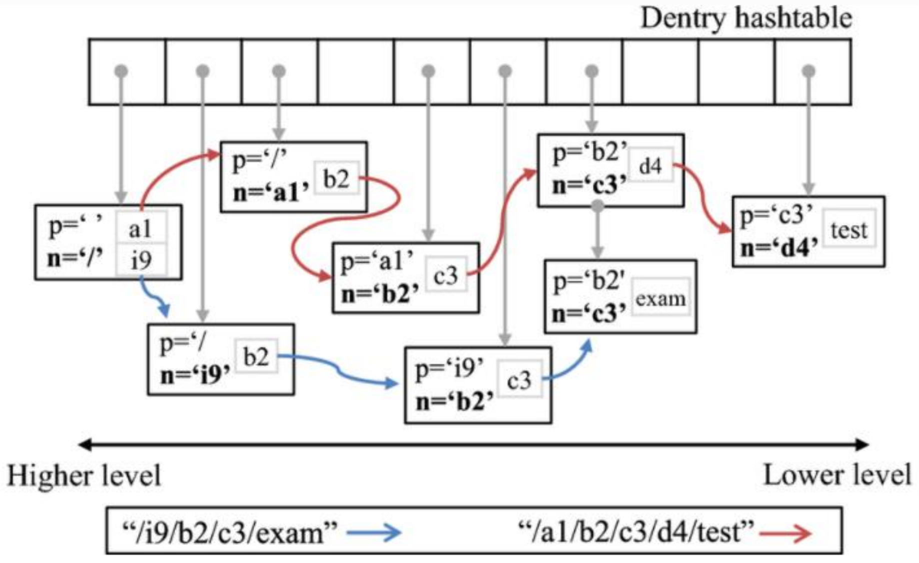
Value → File



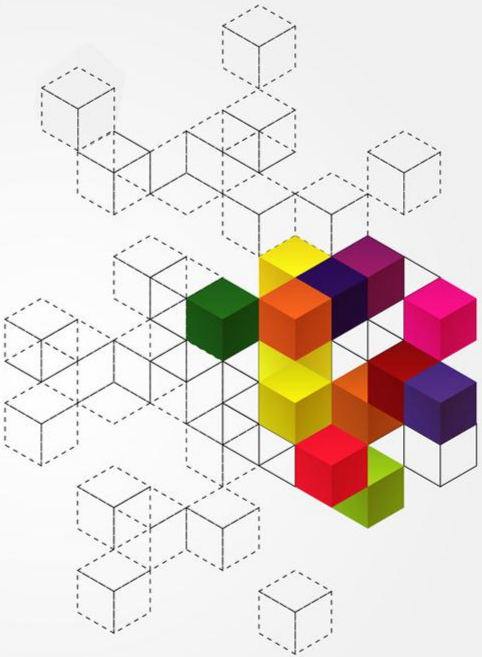
- **Hash Table** – linear list with hash data structure
  - **Decreases directory search time (for a file name)**
  - **Collisions – situations where two file names hash to the same location**
  - **Only good if entries are fixed size (change size requires new hash function, or use chained-overflow method (handle collisions)**

二、目录数据结构

- **Linux目录组织**



The Linux original path lookup mechanism. (The ‘block’ means a dentry structure and ‘p’ means parent's name and ‘n’ means its own name)



本讲小结

- 目录与文件按名存取
- 目录数据结构