

INODE : FILE SYSTEM

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1 Introduction

The inode is a data structure of file system that describes a filesystem object such as a file or a directory. Each inode stores the attributes and disk block location of the object's data. Filesystem object attributes may include metadata (times of last change, access, modification), as well as owner and permission data.

Directories are lists of names assigned to inodes. A directory contains an entry for itself, its parent, and each of its children.

The inode containing metadata about the file can be retrieved by application using `stat`, which returns a `stat` structure described as below.

```
struct stat {  
    dev_t      st_dev;          /* ID of device containing file */  
    ino_t      st_ino;          /* Inode number */  
    mode_t     st_mode;         /* File type and mode */  
    nlink_t    st_nlink;        /* Number of hard links */  
    uid_t      st_uid;          /* User ID of owner */  
    gid_t      st_gid;          /* Group ID of owner */  
    dev_t      st_rdev;         /* Device ID (if special file) */  
    off_t      st_size;         /* Total size, in bytes */  
    blksize_t  st_blksize;      /* Block size for filesystem I/O */  
    blkcnt_t   st_blocks;       /* Number of 512B blocks allocated */  
  
    struct timespec st_atim;     /* Time of last access */  
    struct timespec st_mtim;     /* Time of last modification */  
    struct timespec st_ctim;     /* Time of last status change */  
  
    #define st_atime st_atim.tv_sec      /* Backward compatibility */  
    #define st_mtime st_mtim.tv_sec  
    #define st_ctime st_ctim.tv_sec  
};
```

The name of the file or directory is not stored as meta-data in inode, when we create a file or directory then a map of file name and inode is created by system and whenever the file is accessed first the system retrieves the inode from the map by file name.