OS Tutorial 8 : Assignment 3

Huan Wang
huanwang@uvic.ca

Part 1 : diskinfo

* Displays basic information about the file system.
  * OS Name: boot sector (starting byte:3, length:8 bytes)
  * Label of the disk: boot sector & root directory
  * Total size of the disk: total sector count * 512
  * Free size of the disk: go through FAT entries: if the value fat entry == 0x00, then this is a empty sector.

Part 1 : diskinfo

* The number of files in the disk:
  * starting from root directory, traverse the directory tree.
  * *# of files = # of directory entries in each directory*
  * However, skip a directory entry if:

    (1) ***the value of it's atrribute field is 0x0F*** or

    (2) ***the first logical cluster field is 0 or 1*** or

    (3) ***the Volume Label bit of its attribute field is set as 1*** or

    (4) ***the directory_entry is free (see fat-12 doc for details)***
* Number of FAT copies: Boot sector
* Sectors per FAT: Boot sector

Part 2 : disklist

* Display all the contents of all directories in the file system
  * first column: F/D: directory entries (attribute field) in each directory.
  * 10 characters to show the file size: directory entries (last field)
  * 20 characters for file name: directory entries (first field)
  * creation date & creation time: directory entry.
    * Date: Year: high 7 bits + 1980, Month: middle 4 bits, Day: low 5 bits
    * Time: Hours: high 5 bits, minutes: middle 6 bits

Part 3 : diskget

* Copies a file from the file system (root directory) to the current directory in Linux:

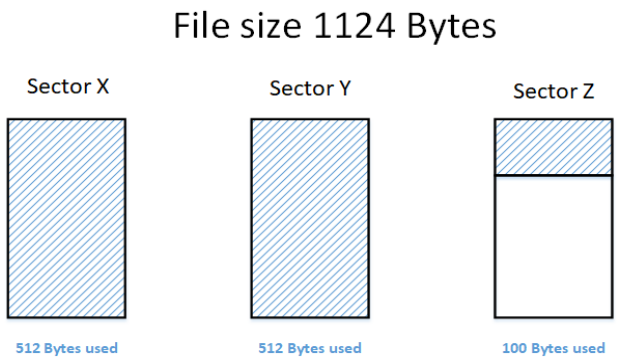
  ./diskget disk.IMA ANS1.PDF

(1) Convert the given filename to upper case, then search this filename from directory entries in root folder.

(2) If filename matching, extract the first logical cluster & file size.

(3) Rely on FAT entries to copy.

(4) If (Last cluster of file && reach the filesize value), stop copy.



Part 4 : diskput

* Copies a file from the current Linux directory into a given directory of the fat-12 file system:

./diskput disk.IMA /subdir1/subdir2/foo.txt

(1) Check if the file exists in the current Linux dir

(2) Check if the specified directory exists in the fat-12 image

(3) Check if the disk has enough space to store the file

(4) Create a new directory entry in th given path (/subdir1/subdir2 in this example)

(5) Go through the FAT entries to find unused sectors in disk and copy the file content to these sectors.

(6) Update the first logical cluster number && file size field of directory entry we just created, and update the FAT entries we used.

Disk Read / Write

* When the disk file is small: mmap - Map File into Memory
  * #include <sys/mman.h>
  * void ***mmap*** (void ***addr**, size_t length, int prot, int flags, int fd, off_t offset)
  * E.g., mmap(0, filesize, PROT_READ, MAP_SHARED, fp, 0);
    mmap(p, filesize);
* When the disk file is large: File Pointer
  * #include <stdio.h>
  * size_t **fread** (void ***ptr**, size_t size, size_t nmemb, FILE *stream)
  * size_t **fwrite** (const void ***ptr**, size_t size, size_t nmemb, FILE *stream)
  * int **fseek** (FILE *stream, long int offset, int whence)