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#ifndef _LFSYS_H_
#define _LFSYS_H_

#include <io.h>

/*
 * define file structure constants
 */

#define FBLK_SIZE      512
#define FBLK_BITS     9
#define FBLK_MASK     0x1FF
#define XTNT_HDR      16
#define BITMAP_BLK    2L
#define DISK_DESC_BLK 1L

/*
 * define bits in file status byte (fstat)
 */

#define _FILE_MODIFIED 0x10
#define _USED          0x40
#define _FILE_BUSY    0x80

/*
 * define operating system constants
 */

#define NCPFN 16

/*
 * Extent header
 */

struct xtnt_hdr {
    long prev_xtnt;
    long next_xtnt;
    long size_xtnt;
    long bound_xtnt;
};

/*
 * Directory Entry
 */

struct dir_entry {
    char fstat;

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    long ffirst_xtnt;
    long flast_xtnt;
    long fnum_blks;
    unsigned fnum_xtnt;
    unsigned char fowner;
    unsigned char fgroup;
    unsigned fnum_chars_free; /* No. unused chars in last block */
    long fseconds;
    unsigned char ftype;
    unsigned char fgperms;
    unsigned char fperms;
    unsigned char fattr;
    unsigned fdate[2];
    char fname[NCPFN + 1];
};

/*
 * File format of directory
 */

struct dir_xtnt { /* Top bit of dir_index is zero */
    unsigned parent_xtnt;
    unsigned dir_index;
    struct dir entrv directory[0];

};

struct ext_dir_xtnt { /* Top bit of dir_index is set */
    unsigned parent_xtnt;
    unsigned dir_index;
    unsigned ext_parent_xtnt;
};

/*
 * Disk control block used by disk_open, disk_close, etc.
 */

struct dcb {
    unsigned dcb_admin;
    unsigned dcb_nid;
    unsigned dcb_tid;
    char dcb_drive;
    char dcb_spare[5];
};

struct r_w_msg {
    char rtype;
    unsigned r_w_drive;
    long r_w_block;
};

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    char r_w_filler(4);
    char r_w_data(8);
    );

/*
 * Disk entry used by drivers
 */

struct disk_entry {
    char disk_type;
    char disk_drv;
    unsigned blk_offset;
    unsigned num_sctrs;
    unsigned sctr_cyl;
    char sctr_trk;
    char disk_entry_reserved;
    unsigned ctl_addr;
    char ctl_int;
    unsigned num_tracks;
    char disk_filler(1);
    };

/*
 * Disk Entru used by disk get entru, disk set entru
 */

struct ldisk_entry {
    struct disk_entry _disk_entry;
    unsigned ext_blk_offset;
    unsigned ext_num_sctrs;
    unsigned write_precomp;
    unsigned disk_arg(3);
    unsigned disk_flags;
    unsigned disk_entry_id;    /* extension valid if 0x1234 */
    };

/*
 * Disk flags:
 */

#define DISK_LARGE_EXTENTS 0x0001
#define DISK_LARGE_BLOCKS 0x0002
#define DISK_LARGE_FSYS 0x0004

/*
 * File Error Messages ("ored" with ERROR=0x00 on return)
 */

#define UNABLE_TO_ACCESS 1 /* 0x01 */

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#define FILE_BUSY 2 /* 0x82 */
#define DIRECTORY_FULL 3 /* 0x83 */
#define BAD_PATHNAME 4 /* 0x84 */
#define ATTRIBUTE_VIOLATION 5 /* 0x85 */
#define DISK_FULL 6 /* 0x86 */
#define NAME_TOO_LONG 7 /* 0x87 */
#define INVALID_DEVICE 8 /* 0x88 */
#define BAD_DRIVE_NUMBER 9 /* 0x89 */
#define PARTIAL_MATCH 10 /* 0x8A */
#define TOO_MANY_OPEN_FILES 11 /* 0x8B */
#define CORRUPT_DIRECTORY 12 /* 0x8C */
#define FSYS_NO_ACCESS 13 /* 0x8D */
#define TOO_MANY_EXTENTS 14 /* 0x8E */

#endif _LFSYS_H_
```