COSC 3750

File information

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What is available?

- What objects are in a directory.
- What the objects permissions are.
- When the object was last modified.
- Ownership info.
- Link information.

stat(2)

- Read a filesystem objects "status."
- There are three functions.
  - *stat(2)* – takes a path
  - *fstat(2)* – takes a file descriptor
  - *lstat(2)* – like *stat()* except link info versus file info.

(more . . .)

- We have access to the mode (permissions) and type via the *struct stat*'s *st_mode* field.
- All you have to if figure out how to map an unsigned 32-bit value to a string like **-rw-r--r--**.
- Any ideas?

“restrict”

- Tells the compiler that only this pointer or one derived from will access this item.
- Means that any pointer assignment should generate a compiler warning.
- Just help to keep programmers from making mistakes.

struct stat

```
dev_t     st_dev;       /*ID of device with 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(special files) */
off_t     st_size;      /* Total size, in bytes */
blksize_t st_blksize;   /* Block size for fs I/O */
blkcnt_t  st_blocks;    /* Number of 512B blks alloc. */
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 */
```

Names

- What about the username and group name?
- Well, we have a *st_uid* and an *st_gid*.
- What does that give us?
- More unsigned 32-bit integers.

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- There are, strangely, some functions that can help us here.
- Their names are obvious: *getpwuid(3)* and *getgrgid(3)*.
- Given uid or gid, these functions will give us access to structures that contain the names we want.
- Simple.

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- So we have the permissions and names.
- The sizes are easy, its just there as a number of bytes.
- Then there is the date/time.
- No problem, we have *st_?tim* field. All we need right?
- Sort of

(more . . .)

- The *struct timespec* is a POSIX time representation.
- Similar to the *struct timeval* except it has nanoseconds instead of microseconds.
- The only part you need is the *tv_sec* portion.

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- Well, first we have to use *localtime(3)* to get a structure that converts an unsigned integer *st_mtim.tv_sec* to a time, sort of.
- Then, of course, we use *strftime(3)* to format the time to something we can print out.

Links

- If the entry is a link we probably need the name of the file at the end.
- We can use *readlink(2)* for this.
- It is pretty simple, give the name of link, get the name of the file.

Now the file's names

- Read the directories.
- How?
  - *opendir()*,
  - *readdir()*,
  - *closedir()*.

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- *opendir()* returns a pointer to a DIR.
- Pass *readdir(3)* the DIR * and it returns a pointer to a `struct dirent`.
- That has the name of all the objects in the directory.
- There are actually two problems with this.

(more . . .)

- The entries in the directory are in no guaranteed order.
- There are two entries that you have watch out for.
- Any idea what they are?

(more . . .)

- The entries in the directory are in no guaranteed order.
- There are two entries that you have watch out for.
- Any idea what they are?
- . and ..