Programming Assignment #2 **Due: 3/8**

1. [100 points] Using what you know about permissions and the various system routines, write a program called `whocan` as described by the attached "`man`" page (q.v.). This is actually a useful program to find out things like "Who can read my home directory?"

   Notes:

   - Remember that *fsobj* may include leading relative or absolute directory information and note rules about searching directory trees.

   - Your program should not require opening *fsobj*.

   - Make use of the system `get[pw|gr]ent(3)` and similar routines rather than reading the `/etc/*` files directly.

   - The program should follow symbolic links, so that if `alink` symlinks to `a`, "`$ ./whocan read alink`" is identical to "`$ ./whocan read a`". Permissions on the link itself are irrelevant.

   - Use the `errno` and `perror` facilities to return exit status and issue error messages. (The `SYSCALL_CHECK()` macro does this.)

   - Don't worry about deleting a non-empty directory: If *fsobj* is a directory to be deleted, assume it's empty. `whocan`'s job is to evaluate permissions, not predict success.

   - Watch out for the "sticky" bit. (See Stevens & Rago)

   - Don't include extraneous output text. Output should be a list of zero or more logins (to standard output), a single line "`(everyone)`" (see the `man` page), or an error message (to standard error). (This makes `whocan` couth and more useful in scripts.)

   - Remember that `root` is *almost* omnipotent. The "almost" applies because there are things that are logically impossible, like executing a directory or `cd`'ing to a regular file.

NAME

`whocan` - print a list of what users can perform a particular action on a particular file, directory, or device

SYNOPSIS

`whocan` *action fsobj*

DESCRIPTION

whocan prints a list on standard output of all user login names (one name per line, each line unique, sorted in ascending ASCII/ISO order) who can perform action *action* on filesystem object (file, directory, or device) *fsobj*.

Possible values of *action* and their meanings for different types of objects are:

action	type of *fsobj*	List all users who can...
cd	directory	change their current directory to *fsobj*.
delete	all	delete *fsobj*.
execute	file	execute *fsobj*.
ls	directory	list the contents of the directory *fsobj*. (synonym for `read`)
ls	file, device	list the file or device *fsobj*.
read	all	open *fsobj* for reading.
search	directory	search *fsobj*.
write	directory	add or delete files in *fsobj*.
write	file, device	open *fsobj* for writing.

Notes:

- In the special case where everyone in the login database can perform *action* to *fsobj* (e.g., "`whocan cd /`"), `whocan` will output a single line "`(everyone)`".
- "`ls`" above refers to the "`/bin/ls`" command, run without any additional flags such as "`--color`" or "`-F`".

EXAMPLE

```
$ whocan read grades_360s22.ods
bobl
root
```

ERRORS

`whocan` notes errors by writing an appropriate message to standard error and then exiting with an error status.