POSIX I/O

The fun stuff!

POSIX

Posix is a family of standards specified by the IEEE. These standards maintains compatibility across variants of Unix-like operating systems by defining APIs and standards for basic I/O (file, terminal, and network) and for threading.

1) What does POSIX stand for?

Portable Operating System Interface

1) Why might a POSIX standard be beneficial? From an application perspective? Versus using the C stdio library?

- **More explicit control since read and write functions are system calls and you can directly access system resources.**
- **POSIX calls are unbuffered so you can implement your own buffer strategy on top of read()/write().**
- **There is no standard higher level API for network and other I/O devices**

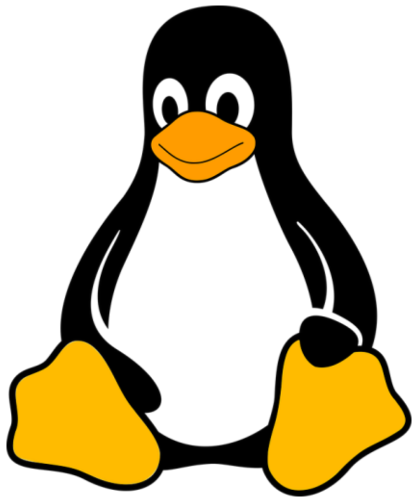
Review from Lecture

```
ssize_t read(int fd, void *buf, size_t count)
```

An error occurred	`result = -1`
	`errno = error`

Already at EOF	`result = 0`
Partial Read	`result < count`
Success!	`result == count`

New Scenario - Messy Roommate



- The Linux kernel is now your roommate

- There are N pieces of trash in the room

- There is a single trash can, `char bin[N]`
  - (For some reason, the trash goes in a particular order)

- You can tell your roommate to pick it up, but he/she is unreliable

New Scenario - Messy Roommate

`NumTrash pickup(roomNum, trashCan, Amount)`

“*I tried to start cleaning, but something came up*” (got hungry, had a midterm, room was locked, etc.)	`NumTrash == -1` `errno == excuse`
“*You told me to pick up trash, but the room was already clean*”	`NumTrash == 0`
“*I picked up some of it, but then I got distracted by my favorite show on Netflix*”	`NumTrash < Amount`
“*I did it! I picked up all the trash!*”	`NumTrash == Amount`

```
NumTrash pickup(roomNum, trashCan, Amount)
```

How do we get the room clean?

`NumTrash == -1, errno == excuse`
`NumTrash == 0`
`NumTrash < Amount`
`NumTrash == Amount`

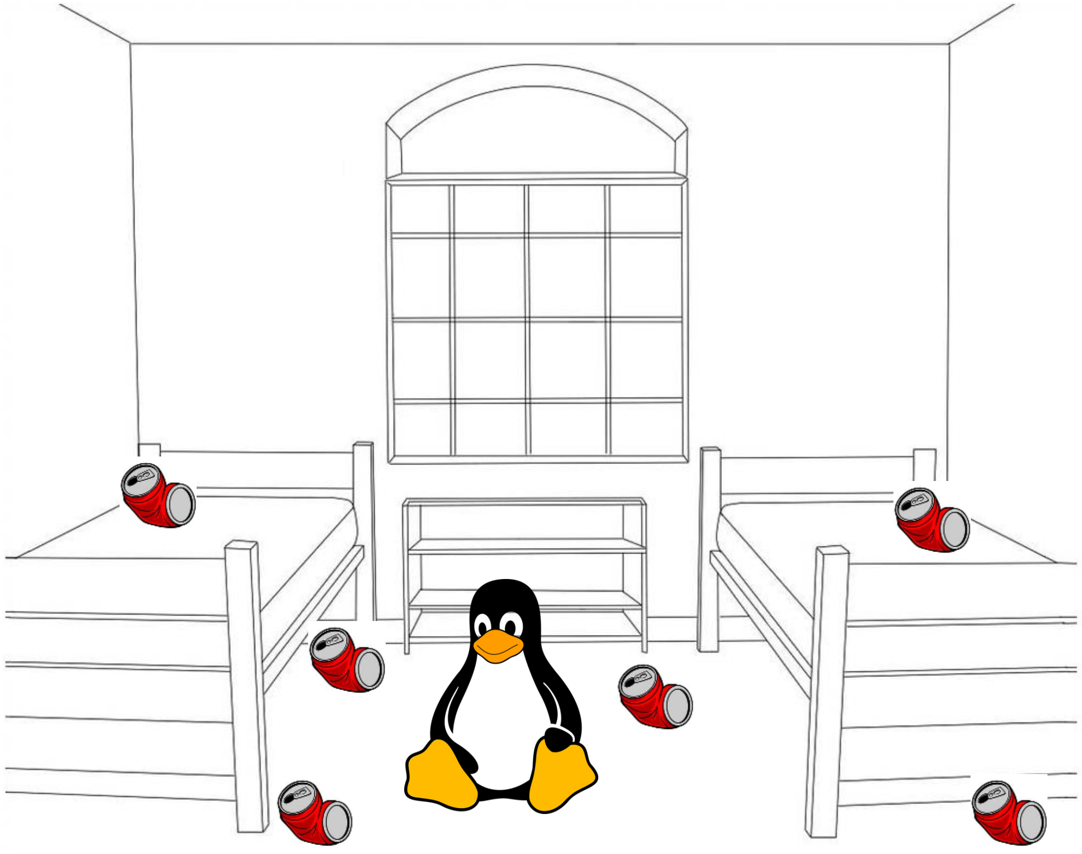
- Use a loop. What's the (high level) goal?
  - Pick up all N pieces of trash
- What if the roommate returns -1 with an excuse?
  - If it's a valid excuse, stop telling them to pick up trash
  - If it's not, start over at the top of the loop
- What if the room is already clean?
  - Stop telling the roommate to pick up trash
- What if the roommate only picked up some of it?
  - Record how much they picked up, and tell them to pick up the rest
- What if the roommate picked up everything you asked?
  - Our goal has been reached!

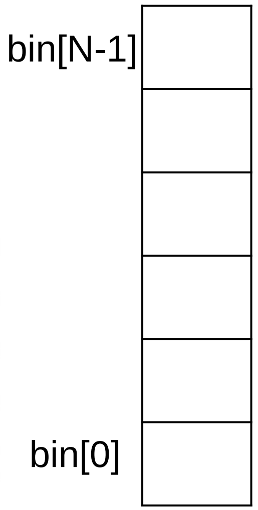
That's it!

How do we get the room clean?

```
NumTrash pickup(roomNum, trashCan, Amount)
```

`NumTrash == -1, errno == excuse`
`NumTrash == 0`
`NumTrash < Amount`
`NumTrash == Amount`



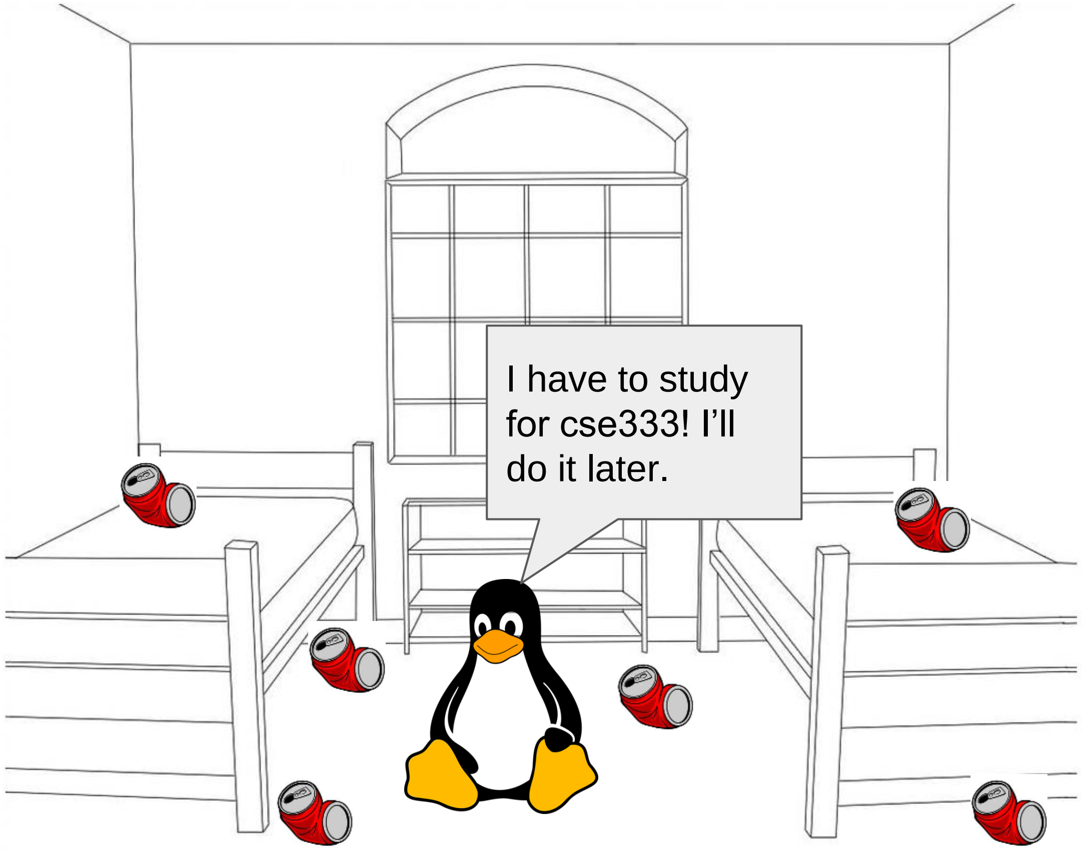


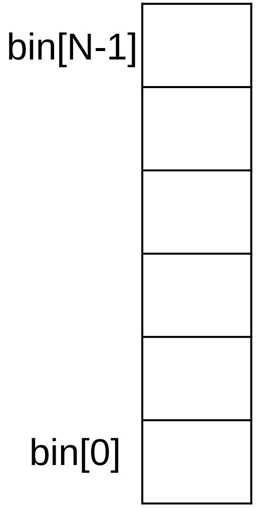
What do we do in the following scenarios?

How do we get the room clean?

```
NumTrash pickup(roomNum, trashCan, Amount)
```

`NumTrash == -1, errno == excuse`
`NumTrash == 0`
`NumTrash < Amount`
`NumTrash == Amount`



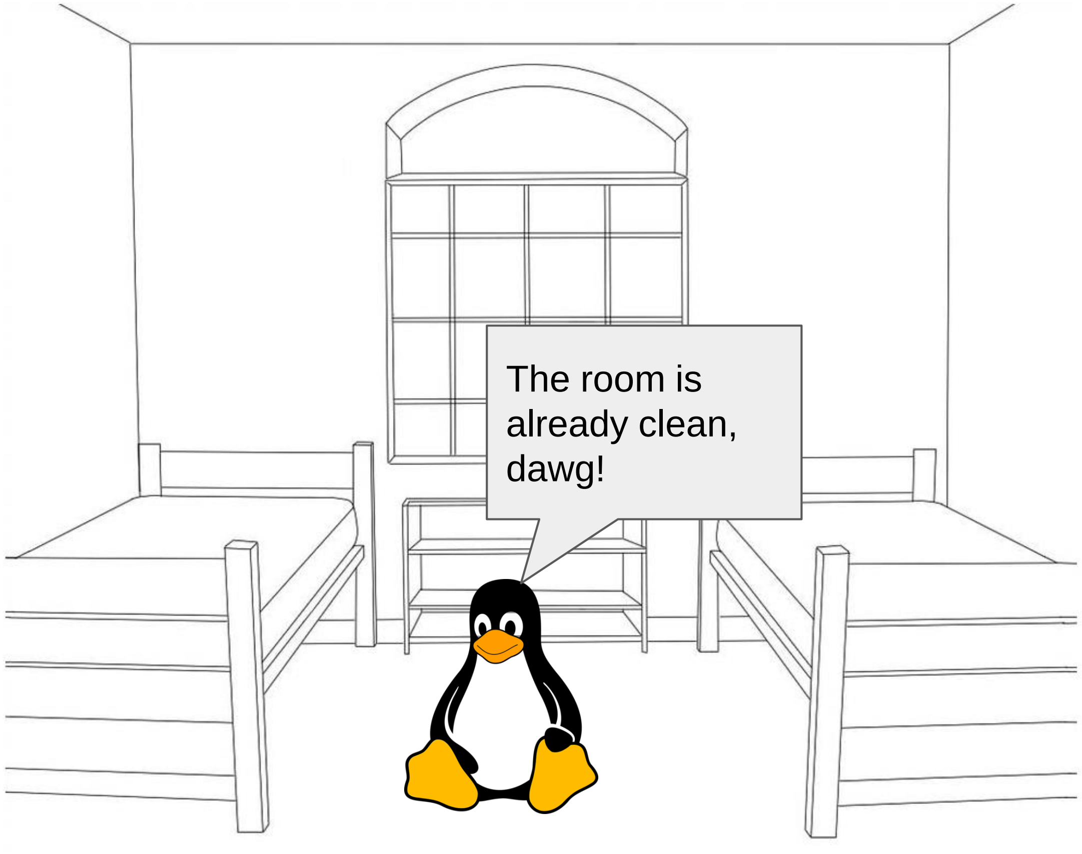


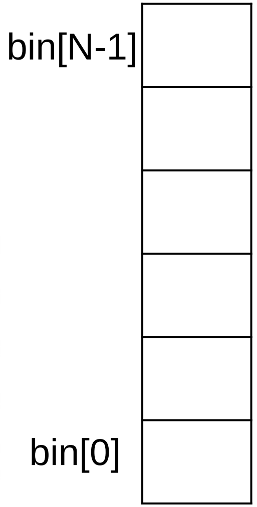
Decide if the excuse is reasonable, and either let it be or ask again.

How do we get the room clean?

```
NumTrash pickup(roomNum, trashCan, Amount)
```

`NumTrash == -1, errno == excuse`
`NumTrash == 0`
`NumTrash < Amount`
`NumTrash == Amount`



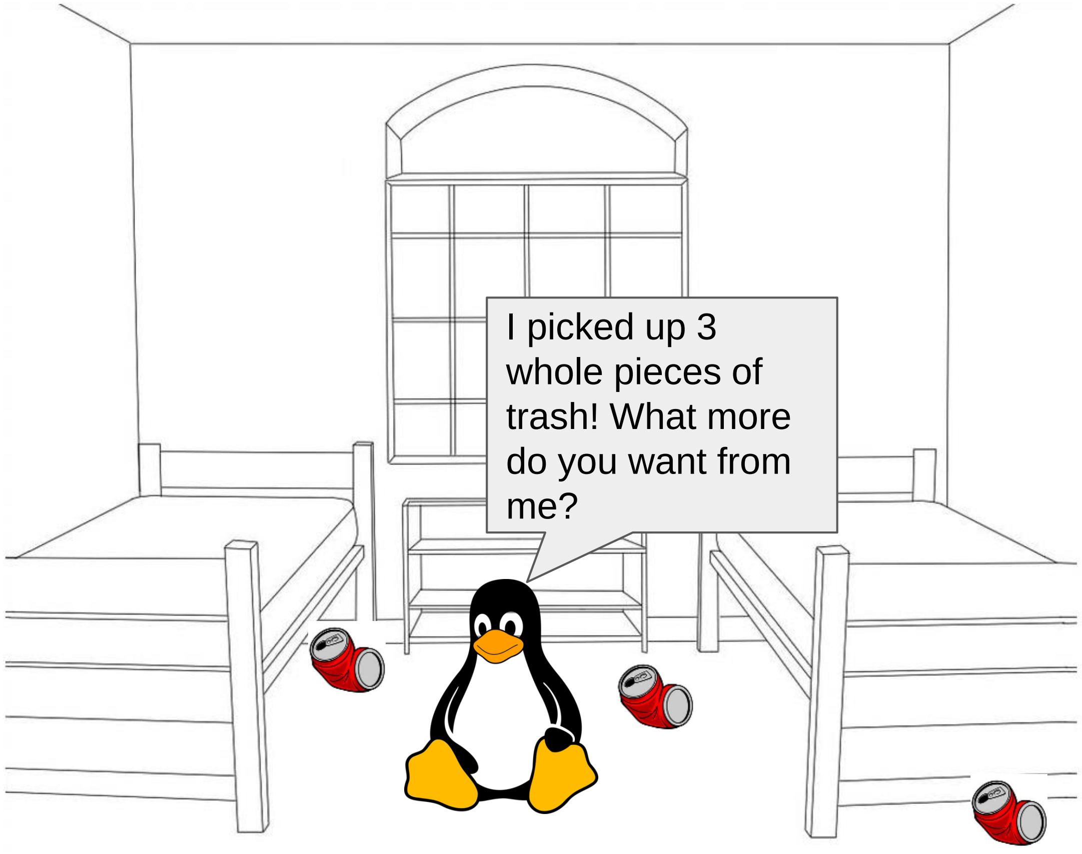


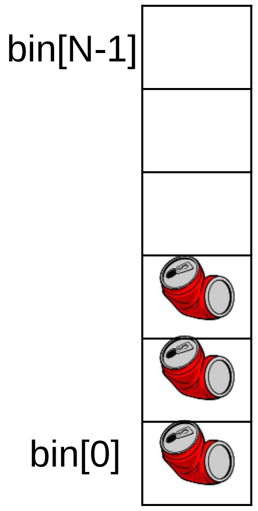
Stop asking them to clean the room! There’s nothing to do.

```
NumTrash pickup(roomNum, trashCan, Amount)
```

How do we get the room clean?

`NumTrash == -1, errno == excuse`
`NumTrash == 0`
`NumTrash < Amount`
`NumTrash == Amount`


I picked up 3 whole pieces of trash! What more do you want from me?



Ask them again to pick up the rest of it.

How do we get the room clean?

```
NumTrash pickup(roomNum, trashCan, Amount)
```

`NumTrash == -1, errno == excuse`
`NumTrash == 0`
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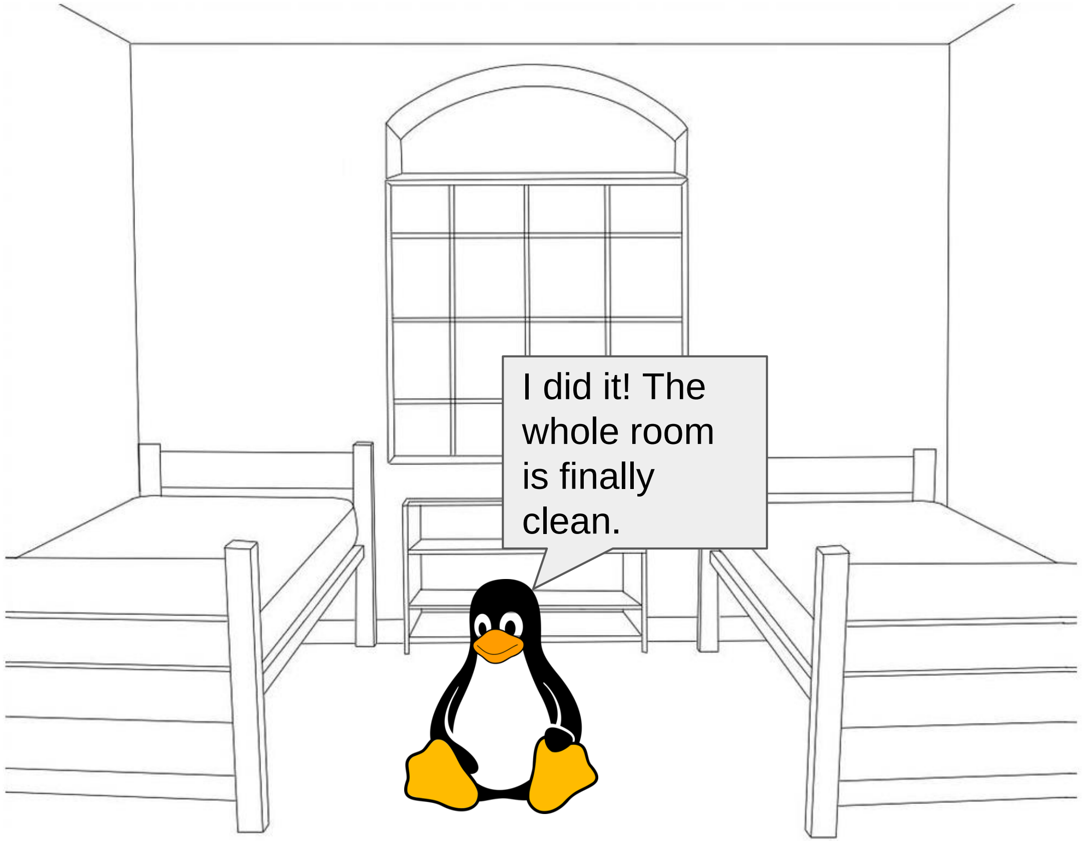

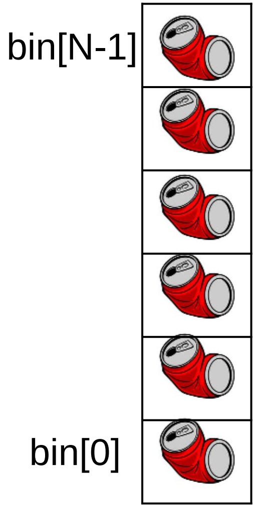

They did what you asked, so stop asking them to pick up trash.

Worksheet Exercise 3

- Write the string `buf` to the file `333.txt`.
- Do not use the `bytes_left` method from lecture.

Worksheet Exercise 7

- Write a C program that is analogous to `ls`.