

CSCI 4061 Discussion 4

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UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

Overview

- Files and File I/O
- Pipes
- I/O rerouting
- Assignment



The File Descriptor

- Integer that is process-unique.
- Used to perform any file operation.
- Also used for pipes and network sockets.



File Operations

Function	Description
<code>fopen(...filename...);</code>	Attempts to open file. Returns descriptor.
<code>fclose(int);</code>	Closes file.
<code>read(fd, buffer, int);</code>	Reads int bytes from fd to buffer.
<code>write(fd, buffer, int);</code>	Writes int bytes from buffer to fd.
<code>lseek(int, off_t, whence)</code>	Move the file pointer off_t bytes from whence.



lseek() Whence

Name	Description
SEEK_SET	Start of file.
SEEK_CUR	Current pointer offset.
SEEK_END	Reads int bytes from fd to buffer.



Examples

```
/* This loop will read contents into buf 10 bytes at a
time. We assume buff is larger than the file. */
for (int i=0; read(fd, buf + (10*i), 10) > 0; ++i){}

// Move file pointer back to start.
lseek(fd, 0, SEEK_SET);

// Write the contents back to the file.
for (int i=0; write(fd, buf + (10*i), 10) > 0; ++i){}
```



File Flags

Flag	Description
O_CREAT	Create file if it doesn't exist.
O_RDONLY	Read-only flag.
O_WRONLY	Write-only flag.
O_RDWR	Read-Write flag.



Pipes

- I/O Channels for IPC
- Treated like files.
 - Use descriptor
 - Read/write like files.
 - Temporary, **do not persist after closing.**



Rerouting With dup2

- `dup2(int old_fd, int new_fd);`
- Reroutes all reads/writes from `new_fd` to `old_fd`. <<<<<< **IMPORTANT**



chmod

- For today's assignment, you will need to use `chmod(char*, int)`.
- Example: `chmod("fname", 0700);`
 - Gives user all permissions.



Assignment

- Today's assignment will be to create an application that can automatically grade your previous assignment.
 - It will take in one argument, an integer to pass to rec3.o
 - A child process will use any exec variant to run rec3.o
 - The output of rec3.o should be rerouted (**dup2**) to a file.
 - Child should pass the the output filename to parent (**pipe**).
 - Once the exec has finished, the parent will read from the output file to confirm rec3.o is correct.
 - The output numbers should be in **ascending order**.
 - `atoi(char*)`, parses an int out of a `char*`.

