Discussion #2

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Overview

- Setup a Programming Environment
- HW2 Overview
- Exec
- Pipes

Programming Environments

- Passwordless SSH setup
  - https://medium.com/@jakewies/accessing-remote-machines-using-ssh-55a0fdf5e9d8
- VS Code
  - Remote Development extension
- Other options:
  - If you are on linux use something like ssh-fs to mount a remote directory to a local path. Then use your favourite text editor.
  - Vim on the server.

HW2 overview

- https://www.ics.uci.edu/~aburtsev/238P/hw/hw2-shell/hw2-shell.html

Exec

- Replaces the calling process's memory with a new memory image loaded from a file stored in the file system.

- The file must have a particular format (ELF format), which specifies which part of the file holds instructions, which part is data, at which instruction to start, etc. xv6 uses the ELF format

- When exec succeeds, it does not return to the calling program; instead, the instructions loaded from the file start executing at the entry point declared in the ELF header

Exec

```
char *argv[3];

argv[0] = "echo";
argv[1] = "hello";
argv[2] = 0;
exec("/bin/echo", argv);
printf("exec error\n");
```

Pipes

- Classic Inter Process Communication mechanism in UNIX.
- Nothing but a buffer in kernel memory.
- Exposed to processes as a pair of file descriptors, one for reading and one for writing
- Writing data to one end makes it available for reading from the other end.

Pipes

```
int p[2];
char *argv[2];

argv[0] = "wc";
argv[1] = 0;

pipe(p);
if(fork() == 0) {
  close(0);
  dup(p[0]);
  close(p[0]);
  close(p[1]);
  exec("/bin/wc", argv);
} else {
  close(p[0]);
  write(p[1], "hello world\n", 12);
  close(p[1]);
}
```