

The following requirements have been implemented:

- Child process creation (see code for reference)

```
void runCommand(char **argv) {    /* run the use
    pid_t pid;
    pid = fork();
    if(pid == 0) {
        if(execvp(*argv, argv) < 0) {    /* mak
            printf("Error: Command not found\n");
            exit(1);
        }
    }
    else {
        wait(NULL);
    }
}
```

- Command history management

```
osc@osc-VirtualBox: ~/work/project01
File Edit View Search Terminal Help
osc@osc-VirtualBox:~/work/project01$ make
gcc -o main main.c
osc@osc-VirtualBox:~/work/project01$ ./main
osh>echo hello
hello
osh>!!
echo hello
hello
osh>
```

- Input and output redirection

```
osc@osc-VirtualBox: ~/work/project01
File Edit View Search Terminal Help
osh>ls -l > in.txt
osh>sort < in.txt
drwxr-xr-x 2 osc osc 4096 Feb 19 14:03 testing
drwxr-xr-x 2 osc osc 4096 Feb 21 19:49 testing
-rw-r--r-- 1 osc osc 340 Feb 21 19:48 in.txt
-rw-r--r-- 1 osc osc 42 Feb 15 13:46 Makefile
-rw-r--r-- 1 osc osc 5518 Feb 16 13:45 test.c
-rw-r--r-- 1 osc osc 7809 Feb 21 19:48 main.c
-rwxr-xr-x 1 osc osc 13488 Feb 21 19:48 main
total 44
osh>
```

Permissions	Owner	Group	Size	Month	Day	Time	File
-rw-r--r--	1	osc	osc	340	Feb	21	19:48 in.txt
-rwxr-xr-x	1	osc	osc	13488	Feb	21	19:48 main
-rw-r--r--	1	osc	osc	7809	Feb	21	19:48 main.c
-rw-r--r--	1	osc	osc	42	Feb	15	13:46 Makefile
-rw-r--r--	1	osc	osc	5518	Feb	16	13:45 test.c
drwxr-xr-x	2	osc	osc	4096	Feb	21	19:49 testing
drwxr-xr-x	2	osc	osc	4096	Feb	19	14:03 testing

- Working directory information

```
osc@osc-VirtualBox: ~/work/project01
File Edit View Search Terminal Help
osh>pwd
/home/osc/work/project01
osh>cd ..
osh>pwd
/home/osc/work
osh>cd project01
osh>pwd
/home/osc/work/project01
osh>
```

The following requirements have been partially implemented:

- Allow the parent and child process to communicate via pipe
 - The pipe is created and executed successfully, but some error occurs between communication. On the left side below, a pipe is used in the normal terminal. On the right, the same command “ls | less” is used for the C program. A difference can be seen

The image shows two side-by-side terminal windows. The left window has a title bar 'osc@osc-VirtualBox: ~/work/project01' and a menu bar 'File Edit View Search Terminal Help'. It displays a directory listing: 'in.txt', 'main', 'main.c', 'Makefile', 'test.c', 'testing', followed by several tilde '~' characters, and ends with '(END)'. The right window has a title bar 'osc@osc-VirtualBox: ~/' and the same menu bar. It displays two lines of environment variable exports: 'export LESSOPEN="| /usr/bin/lesspipe %s";' and 'export LESSCLOSE="/usr/bin/lesspipe %s %s";', followed by '(file 1 of 2) (END) - Next:'. Below this, there are several empty lines and a cursor at the bottom.