

CS69001: Computing Lab – I
Autumn 2009

Assignment 4

Implementation of a mini shell

Due: September 11, 2009 (Friday)

In this assignment, you are required to implement a shell (command interpreter) with limited capabilities. Use the system calls `fork()`, `exec..()`, and `pipe()`. You also need familiarity with file descriptors and the associated functions `open()`, `close()`, and `dup()`.

Part 1: Implement execution of simple commands.

(20)

```
[minish]$ ls
assgn1.c  assgn2.c~  assgn3.c~  forkttest.c
assgn2.c  assgn3.c  assgn4.c  pipetest.c
[minish]$ who
aritrah pts/1          2009-08-27 06:30 (10.5.19.40)
debdeep pts/4          2009-08-27 17:08 (10.5.19.115)
arnab   pts/6          2009-08-27 09:24 (10.5.19.171)
abhij   pts/7          2009-08-27 17:17 (10.5.17.211)
ds      pts/9          2009-08-27 14:27 (ds)
debdeep pts/10         2009-08-24 10:00 (10.5.17.128)
[minish]$
```

Part 2: Allow command-line arguments in simple commands.

(20)

```
[minish]$ ls -l /usr/local/
total 40
drwxr-xr-x 2 root root 4096 2008-09-17 01:56 bin/
drwxr-xr-x 2 root root 4096 2008-03-19 18:51 doc/
drwxr-xr-x 2 root root 4096 2008-03-19 18:51 etc/
drwxr-xr-x 2 root root 4096 2008-03-19 18:51 games/
drwxr-xr-x 2 root root 4096 2008-03-19 18:51 include/
drwxr-xr-x 4 root root 4096 2009-05-25 19:53 lib/
drwxr-xr-x 2 root root 4096 2008-03-19 18:51 libexec/
drwxr-xr-x 2 root root 4096 2008-03-19 18:51 sbin/
drwxr-xr-x 5 root root 4096 2008-09-15 22:46 share/
drwxr-xr-x 2 root root 4096 2008-03-19 18:51 src/
[minish]$ who am i
abhij   pts/7          2009-08-27 17:17 (10.5.17.211)
[minish]$
```

Part 3: Allow one pipe directive in each command.

(30)

```
[minish]$ ls -l /usr/local/ | wc -l
11
[minish]$ who | grep debdeep
debdeep pts/4          2009-08-27 17:08 (10.5.19.115)
debdeep pts/10         2009-08-24 10:00 (10.5.17.128)
[minish]$
```

Part 4: Allow a cascade of pipe directives in each command.

(30)

```
[minish]$ who | grep abhij | wc
      1      5     53
[minish]$ ls -lp /usr/bin/ | grep grep | sort -n -r -k 5 | grep -v bugreport
-rwxr-xr-x 1 root root      84172 2007-11-10 16:35 msggrep
-rwxr-xr-x 1 root root     15800 2008-03-11 17:24 rgrep
-rwxr-xr-x 2 root root     12652 2008-03-12 21:46 pgrep
-rwxr-xr-x 1 root root      4979 2008-01-10 20:42 zgrep
-rwxr-xr-x 1 root root     3335 2008-01-28 19:40 lzgrep
-rwxr-xr-x 1 root root     1438 2008-03-21 08:52 bzgrep
-rwxr-xr-x 1 root root     1188 2008-03-19 00:11 zipgrep
-rwxr-xr-x 1 root root      66 2008-01-10 20:42 zfgrep
-rwxr-xr-x 1 root root      66 2008-01-10 20:42 zegrep
lrwxrwxrwx 1 root root      6 2008-09-15 19:38 lzfgrep -> lzgrep
lrwxrwxrwx 1 root root      6 2008-09-15 19:38 lzegrep -> lzgrep
[minish]$
```

Submit a single C/C++ file solving all the above parts. The file must contain your name and roll number.