

# Operating Systems Lab - CS 314

Rishit Saiya - 180010027, Assignment - 2

January 22, 2021

## 1 Part-1

So, the minimum number of lines required in C are 23 (including `#include` directives/libraries).

Furthermore, this was tested by [Clang](#) compiler in the Minix3 virtual machine. Command: `gmake hello`. (Figure 1)

```
H 288
e 289
l 290
l 291
o 292
  293
W 294
o 295
r 296
l 297
d 298
```

## 2 Part-2

The processes are created in tree like fashion where parent process is created first which creates a child process and processes exit in reverse order, child process exits first and then parent process exits. This order is justified because parent process cannot create a child process until it itself is created and it waits for the child process to exit before exiting itself.

The file `forkexit.c` was changed at `minix/servers/pm` location. The following statement was added in `forkexit.c` file when a process is created:

```
printf("Minix: PID %d created\n", rmc->mp_pid);
```

Similarly, following statement was added in `forkexit.c` file when a process exited:

```

# rm Makefile
# rm 180010027_lab2_part1.zip
# ls
.exrc                                180010027_lab2_part1.zip
.profile                             a.out
# unzip 180010027_lab2_part1.zip
Archive: 180010027_lab2_part1.zip
  extracting: 180010027.c
  extracting: Makefile
# ls
.exrc                                180010027.c                Makefile
.profile                             180010027_lab2_part1.zip  a.out
# gmake hello
H 288
e 289
l 290
l 291
o 292
  293
W 294
o 295
r 296
l 297
d 298
# _

```

Figure 1: gmake hello Command

```
printf("Minix: PID %d exited\n", mp->mp_pid);
```

It was sent to Minix3 VM from Host System (Ubuntu) using SCP. It was later put for make build. Build was completed successfully as shown in Figure 2.

After a successful build and reboot, the changes were reflected in the Minix OS boot as shown in Figure 3.

```

install //usr/lib/fonts
do-hdboot ==> releasetools
install -N /usr/src/etc -c -p -r ../minix/servers/ds/ds /boot/minix/.temp/mod01_
ds
install -N /usr/src/etc -c -p -r ../minix/servers/rs/rs /boot/minix/.temp/mod02_
rs
install -N /usr/src/etc -c -p -r ../minix/servers/pm/pm /boot/minix/.temp/mod03_
pm
install -N /usr/src/etc -c -p -r ../minix/servers/sched/sched /boot/minix/.temp/
mod04_sched
install -N /usr/src/etc -c -p -r ../minix/servers/vfs/vfs /boot/minix/.temp/mod0
5_vfs
install -N /usr/src/etc -c -p -r ../minix/drivers/storage/memory/memory /boot/mi
nix/.temp/mod06_memory
install -N /usr/src/etc -c -p -r ../minix/drivers/tty/tty/tty /boot/minix/.temp/
mod07_tty
install -N /usr/src/etc -c -p -r ../minix/fs/mfs/mfs /boot/minix/.temp/mod08_mfs
install -N /usr/src/etc -c -p -r ../minix/servers/vm/vm /boot/minix/.temp/mod09_
vm
install -N /usr/src/etc -c -p -r ../minix/fs/pfs/pfs /boot/minix/.temp/mod10_pfs
install -N /usr/src/etc -c -p -r ../sbin/init/init /boot/minix/.temp/mod11_init
Done.
Build started at: Wed Jan 20 21:16:55 IST 2021
Build finished at: Wed Jan 20 21:19:50 IST 2021
# _

```

Figure 2: Build Complete

```

Minix: PID 249 exited
# ls
Minix: PID 250 created
.exrc .profile
Minix: PID 250 exited
#

```

Figure 3: PID created and PID exited