

**AIM:** Adam is working in an IT company. He has been given a task to reduce the load of a system by killing some of the processes running in the LINUX operating system. Which commands will he use to complete the given task with the help of the following operation?

- Kill processes by name

```
Feb 2 5:13 PM
m309@m309-BY-OEM: ~
m309@m309-BY-OEM:~$ ps aux
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.1  0.1 23736 14604 ?        Ss   15:44   0:06 /sbin/init splash
root         2  0.0  0.0      0     0 ?        S    15:44   0:00 [kthreadd]
root         3  0.0  0.0      0     0 ?        S    15:44   0:00 [pool_workqueue_release]
root         4  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-rcu_gp]
root         5  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-sync_wq]
root         6  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-kvfree_rcu_reclaim]
root         7  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-slub_flushwq]
root         8  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-netns]
root        11  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/0:0H-events_highpri]
root        13  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-mm_percpu_wq]
root        14  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_tasks_kthread]
root        15  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_tasks_rude_kthread]
root        16  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_tasks_trace_kthread]
root        17  0.0  0.0      0     0 ?        S    15:44   0:00 [ksoftirqd/0]
root        18  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_preempt]
root        19  0.0  0.0      0     0 ?        S    15:44   0:00 [rcu_exp_par_gp_kthread_worker/0]
root        20  0.0  0.0      0     0 ?        S    15:44   0:00 [rcu_exp_gp_kthread_worker]
root        21  0.0  0.0      0     0 ?        S    15:44   0:00 [migration/0]
root        22  0.0  0.0      0     0 ?        S    15:44   0:00 [idle_inject/0]
root        23  0.0  0.0      0     0 ?        S    15:44   0:00 [cpuhp/0]
root        24  0.0  0.0      0     0 ?        S    15:44   0:00 [cpuhp/1]
root        25  0.0  0.0      0     0 ?        S    15:44   0:00 [idle_inject/1]
root        26  0.0  0.0      0     0 ?        S    15:44   0:00 [migration/1]
root        27  0.0  0.0      0     0 ?        S    15:44   0:00 [ksoftirqd/1]
root        29  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/1:0H-events_highpri]
root        30  0.0  0.0      0     0 ?        S    15:44   0:00 [cpuhp/2]
root        31  0.0  0.0      0     0 ?        S    15:44   0:00 [idle_inject/2]
root        32  0.0  0.0      0     0 ?        S    15:44   0:00 [migration/2]
root        33  0.0  0.0      0     0 ?        S    15:44   0:00 [ksoftirqd/2]
```

```
root      8550  0.0  0.0      0     0 ?        I<  17:12   0:00 [kworker/u17:0]
m309      8557  1.7  0.6 698712 56156 ?        Ssl 17:12   0:00 /usr/libexec/gnome-terminal-server
m309      8572  0.0  0.0  11024  4976 pts/0    Ss  17:12   0:00 bash
m309      8672  0.0  0.0  13748  4592 pts/0    R+  17:12   0:00 ps aux
m309@m309-BY-OEM:~$ ps aux | grep firefox
m309      8674  0.0  0.0   9144  2248 pts/0    S+  17:12   0:00 grep --color=auto firefox
m309@m309-BY-OEM:~$ kill 8674
bash: kill: (8674) - No such process
m309@m309-BY-OEM:~$
```

- Kill a process based on the process name

```

Feb 2 5:15 PM
m309@m309-BY-OEM: ~
m309 8672 0.0 0.0 13748 4592 pts/0 R+ 17:12 0:00 ps aux
m309@m309-BY-OEM:~$ ps aux | grep firefox
m309 8674 0.0 0.0 9144 2248 pts/0 S+ 17:12 0:00 grep --color=auto firefox
m309@m309-BY-OEM:~$ kill 8674
bash: kill: (8674) - No such process
m309@m309-BY-OEM:~$ ps aux
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.1  0.1  23736 14604 ?        Ss   15:44   0:06 /sbin/init splash
root         2  0.0  0.0      0     0 ?        S    15:44   0:00 [kthreadd]
root         3  0.0  0.0      0     0 ?        S    15:44   0:00 [pool_workqueue_release]
root         4  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-rcu_gp]
root         5  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-sync_wq]
root         6  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-kvfree_rcu_reclaim]
root         7  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-slub_flushwq]
root         8  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-netns]
root        11  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/0:0H-events_highpri]
root        13  0.0  0.0      0     0 ?        I<   15:44   0:00 [kworker/R-mm_percpu_wq]
root        14  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_tasks_kthread]
root        15  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_tasks_rude_kthread]
root        16  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_tasks_trace_kthread]
root        17  0.0  0.0      0     0 ?        S    15:44   0:00 [ksoftirqd/0]
root        18  0.0  0.0      0     0 ?        I    15:44   0:00 [rcu_preempt]
root        19  0.0  0.0      0     0 ?        S    15:44   0:00 [rcu_exp_par_gp_kthread_worker/0]
root        20  0.0  0.0      0     0 ?        S    15:44   0:00 [rcu_exp_gp_kthread_worker]
root        21  0.0  0.0      0     0 ?        S    15:44   0:00 [migration/0]
root        22  0.0  0.0      0     0 ?        S    15:44   0:00 [idle_inject/0]
root        23  0.0  0.0      0     0 ?        S    15:44   0:00 [cpuhp/0]
root        24  0.0  0.0      0     0 ?        S    15:44   0:00 [cpuhp/1]
root        25  0.0  0.0      0     0 ?        S    15:44   0:00 [idle_inject/1]
root        26  0.0  0.0      0     0 ?        S    15:44   0:00 [migration/1]
root        27  0.0  0.0      0     0 ?        S    15:44   0:00 [ksoftirqd/1]

```

```

Feb 2 5:16 PM
m309@m309-BY-OEM: ~
root      8057 0.0 0.0      0     0 ?        I    17:10   0:00 [kworker/1:0-events]
m309      8072 13.9 3.1 34288796 256160 ?        Sl   17:11   0:38 /snap/chromium/3010/usr/lib/chromium-browser/chrome --password-store
m309      8154 0.0 0.0 33568844 3592 ?        Sl   17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome_crashpad_handler
m309      8156 0.0 0.0 33560632 3376 ?        S    17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome_crashpad_handler
m309      8160 0.0 0.7 33926264 60872 ?        S    17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=zygote --
m309      8161 0.0 0.7 33926252 60688 ?        S    17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=zygote --
m309      8163 0.0 0.1 33926280 15620 ?        S    17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=zygote --
m309      8174 0.6 0.9 541476 80312 ?        Sl   17:11   0:01 /usr/bin/Xwayland :0 -rootless -noreset -accessx -core -auth /run/us
m309      8183 0.0 0.9 762948 76152 ?        Ssl  17:11   0:00 /usr/libexec/gsd-xsettings
m309      8208 0.0 0.3 267132 24792 ?        Sl   17:11   0:00 /usr/libexec/ibus-x11
m309      8214 0.2 1.2 1153320 97740 ?        Sl   17:11   0:00 /usr/libexec/mutter-x11-frames
m309      8271 1.9 2.4 34441436 195104 ?        Sl   17:11   0:05 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=gpu-proce
m309      8288 1.1 1.3 33913600 110892 ?        Sl   17:11   0:03 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=utility -
m309      8298 0.0 0.6 33976752 53120 ?        Sl   17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=utility -
m309      8428 0.5 1.9 1212101844 157244 ?        Sl   17:11   0:01 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=renderer
m309      8440 0.0 0.5 67523116 46096 ?        Sl   17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=utility -
m309      8452 0.2 1.6 1212098540 133984 ?        Sl   17:11   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=renderer
m309      8477 36.1 5.8 1215605132 468332 ?        Sl   17:11   1:35 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=renderer
root      8550 0.0 0.0      0     0 ?        D<   17:12   0:00 [kworker/u17:0+i915_flip]
m309      8557 0.8 0.7 699860 57308 ?        Ssl  17:12   0:01 /usr/libexec/gnome-terminal-server
m309      8572 0.0 0.0 11024 4976 pts/0 Ss   17:12   0:00 bash
m309      8747 0.0 0.1 462200 8764 ?        Sl   17:13   0:00 /usr/libexec/gvfsd-network --spawner :1.20 /org/gtk/gvfs/exec_spaw/1
m309      8763 0.0 0.1 390548 8880 ?        Sl   17:13   0:00 /usr/libexec/gvfsd-dnssd --spawner :1.20 /org/gtk/gvfs/exec_spaw/3
root      8862 0.0 0.0      0     0 ?        I    17:14   0:00 [kworker/2:1]
m309      8864 0.0 0.8 1212078408 68100 ?        Sl   17:14   0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=renderer
m309      8882 100 0.0 13748 4568 pts/0 R+   17:15   0:00 ps aux
m309@m309-BY-OEM:~$ ps aux | grep firebox
m309      8897 0.0 0.0 9144 2248 pts/0 S+   17:16   0:00 grep --color=auto firebox
m309@m309-BY-OEM:~$ killall firebox
firebox: no process found
m309@m309-BY-OEM:~$

```



- Kill a single process at a time with the given process ID

```

Feb 2 5:18 PM
m309@m309-BY-OEM: ~
m309 9025 100 0.0 13748 4584 pts/0 R+ 17:18 0:00 ps aux
m309@m309-BY-OEM:~$ ps aux | grep chrome
m309 8072 11.4 3.1 34288156 255108 ? Sl 17:11 0:51 /snap/chromium/3010/usr/lib/chromium-browser/chrome --password-store
=basic --disable-features=TFLiteLanguageDetectionEnabled
m309 8154 0.0 0.0 33568844 3592 ? Sl 17:11 0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome_crashpad_handler
--monitor-self --monitor-self-annotation=ptype=crashpad-handler --database=/home/m309/snap/chromium/common/chromium/Crash Reports --an
notation=channel=snap --annotation=lsb-release=Ubuntu Core 22 --annotation=plat=Linux --annotation=prod=Chrome_Linux --annotation=ver=1
31.0.6778.139 --initial-client-fd=5 --shared-client-connection
m309 8156 0.0 0.0 33560632 3376 ? S 17:11 0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome_crashpad_handler
--no-periodic-tasks --monitor-self-annotation=ptype=crashpad-handler --database=/home/m309/snap/chromium/common/chromium/Crash Reports
--annotation=channel=snap --annotation=lsb-release=Ubuntu Core 22 --annotation=plat=Linux --annotation=prod=Chrome_Linux --annotation=
ver=131.0.6778.139 --initial-client-fd=4 --shared-client-connection
m309 8160 0.0 0.7 33926264 60872 ? S 17:11 0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=zygote --
no-zygote-sandbox --string-annotations --crashpad-handler-pid=8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable
m309 8161 0.0 0.7 33926252 60688 ? S 17:11 0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=zygote --
string-annotations --crashpad-handler-pid=8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable
m309 8163 0.0 0.1 33926280 15620 ? S 17:11 0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=zygote --
string-annotations --crashpad-handler-pid=8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable
m309 8271 2.1 2.3 34427040 185656 ? Sl 17:11 0:09 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=gpu-proce
ss --string-annotations --crashpad-handler-pid=8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable --gpu-preferences
=UAAAAAAAAAAgAAAEAAAAAAAAAAAAAAAAABgAAEAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAQAAABAAAAAAAAAAEAAAAAAAAAAIAAAAAAAAAAAgAAAAAAAAAA --sha
red-files --field-trial-handle=3,i,14902952784849514346,9959533870011433259,262144 --disable-features=EyeDropper,TFLiteLanguageDetectio
nEnabled --variations-seed-version
m309 8288 0.7 1.3 33913600 110924 ? Sl 17:11 0:03 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=utility -
utility-sub-type=network.mojom.NetworkService --lang=en-US --service-sandbox-type=none --string-annotations --crashpad-handler-pid=815
4 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable --shared-files=v8_context_snapshot_data:100 --field-trial-handle=3,
i,14902952784849514346,9959533870011433259,262144 --disable-features=EyeDropper,TFLiteLanguageDetectionEnabled --variations-seed-versio
n
m309 8298 0.0 0.6 33976752 53120 ? Sl 17:11 0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=utility -
utility-sub-type=storage.mojom.StorageService --lang=en-US --service-sandbox-type=utility --string-annotations --crashpad-handler-pid=
8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable --shared-files=v8_context_snapshot_data:100 --field-trial-handle

```

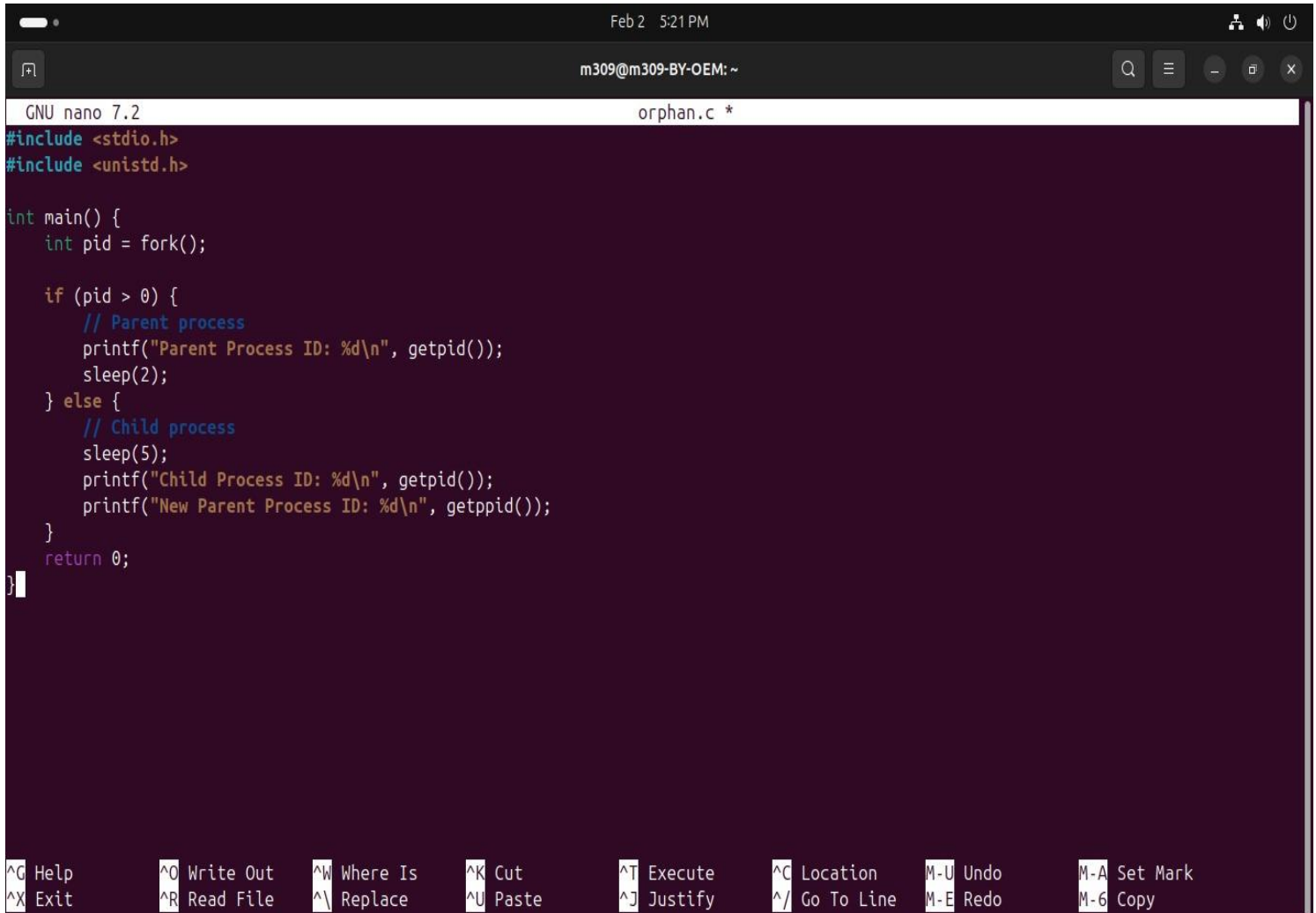
```

--string-annotations --crashpad-handler-pid=8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable --lang=en-US --num-r
aster-threads=2 --enable-main-frame-before-activation --renderer-client-id=10 --time-ticks-at-unix-epoch=-1770027278097276 --launch-tim
e-ticks=5189675089 --shared-files=v8_context_snapshot_data:100 --field-trial-handle=3,i,14902952784849514346,9959533870011433259,262144
--disable-features=EyeDropper,TFLiteLanguageDetectionEnabled --variations-seed-version
m309 8477 27.6 5.5 1215597516 446052 ? Sl 17:11 2:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=renderer
--string-annotations --crashpad-handler-pid=8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable --lang=en-US --num-r
aster-threads=2 --enable-main-frame-before-activation --renderer-client-id=12 --time-ticks-at-unix-epoch=-1770027278097276 --launch-tim
e-ticks=5191883523 --shared-files=v8_context_snapshot_data:100 --field-trial-handle=3,i,14902952784849514346,9959533870011433259,262144
--disable-features=EyeDropper,TFLiteLanguageDetectionEnabled --variations-seed-version
m309 9012 0.0 0.8 1212078408 68036 ? Sl 17:17 0:00 /snap/chromium/3010/usr/lib/chromium-browser/chrome --type=renderer
--string-annotations --crashpad-handler-pid=8154 --enable-crash-reporter=snap --change-stack-guard-on-fork=enable --lang=en-US --num-r
aster-threads=2 --enable-main-frame-before-activation --renderer-client-id=37 --time-ticks-at-unix-epoch=-1770027278097276 --launch-tim
e-ticks=5585528792 --shared-files=v8_context_snapshot_data:100 --field-trial-handle=3,i,14902952784849514346,9959533870011433259,262144
--disable-features=EyeDropper,TFLiteLanguageDetectionEnabled --variations-seed-version
m309 9044 0.0 0.0 9144 2140 pts/0 S+ 17:18 0:00 grep --color=auto chrome
m309@m309-BY-OEM:~$ kill 8156
m309@m309-BY-OEM:~$ kill -9 8156
bash: kill: (8156) - No such process
m309@m309-BY-OEM:~$

```

## 2. Write a program for process creation using C

- Orphan Process



```
GNU nano 7.2 orphan.c *
#include <stdio.h>
#include <unistd.h>

int main() {
    int pid = fork();

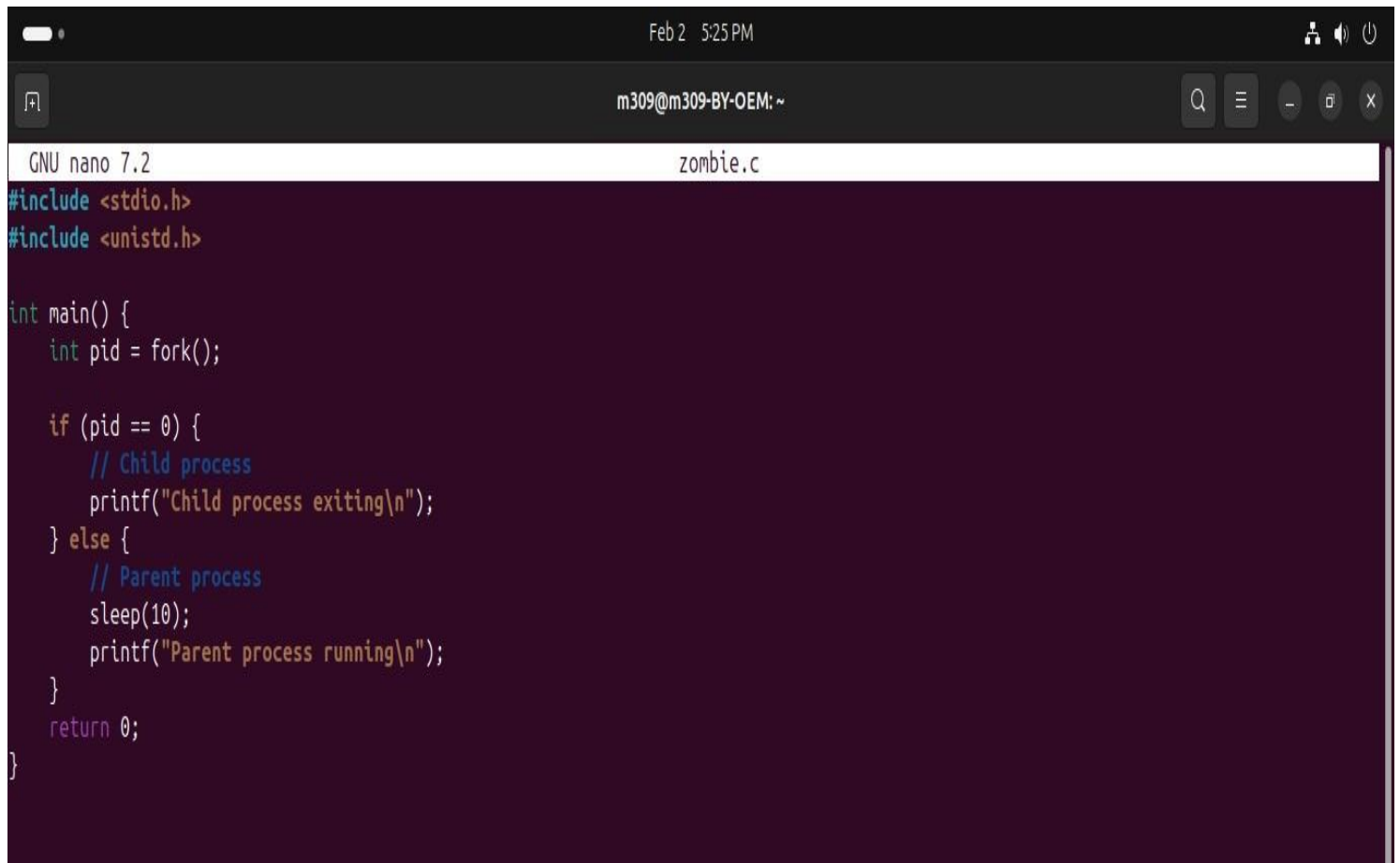
    if (pid > 0) {
        // Parent process
        printf("Parent Process ID: %d\n", getpid());
        sleep(2);
    } else {
        // Child process
        sleep(5);
        printf("Child Process ID: %d\n", getpid());
        printf("New Parent Process ID: %d\n", getppid());
    }
    return 0;
}
```

^G Help   ^O Write Out   ^W Where Is   ^K Cut   ^T Execute   ^C Location   M-U Undo   M-A Set Mark  
^X Exit   ^R Read File   ^\ Replace   ^U Paste   ^J Justify   ^\_ Go To Line   M-E Redo   M-6 Copy

```
m309@m309-BY-OEM: ~$ nano orphan.c
m309@m309-BY-OEM: ~$ gcc orphan.c -o orphan
m309@m309-BY-OEM: ~$ ./orphan
Parent Process ID: 9285
m309@m309-BY-OEM: ~$ Child Process ID: 9286
New Parent Process ID: 2262
```



- Zombie Process



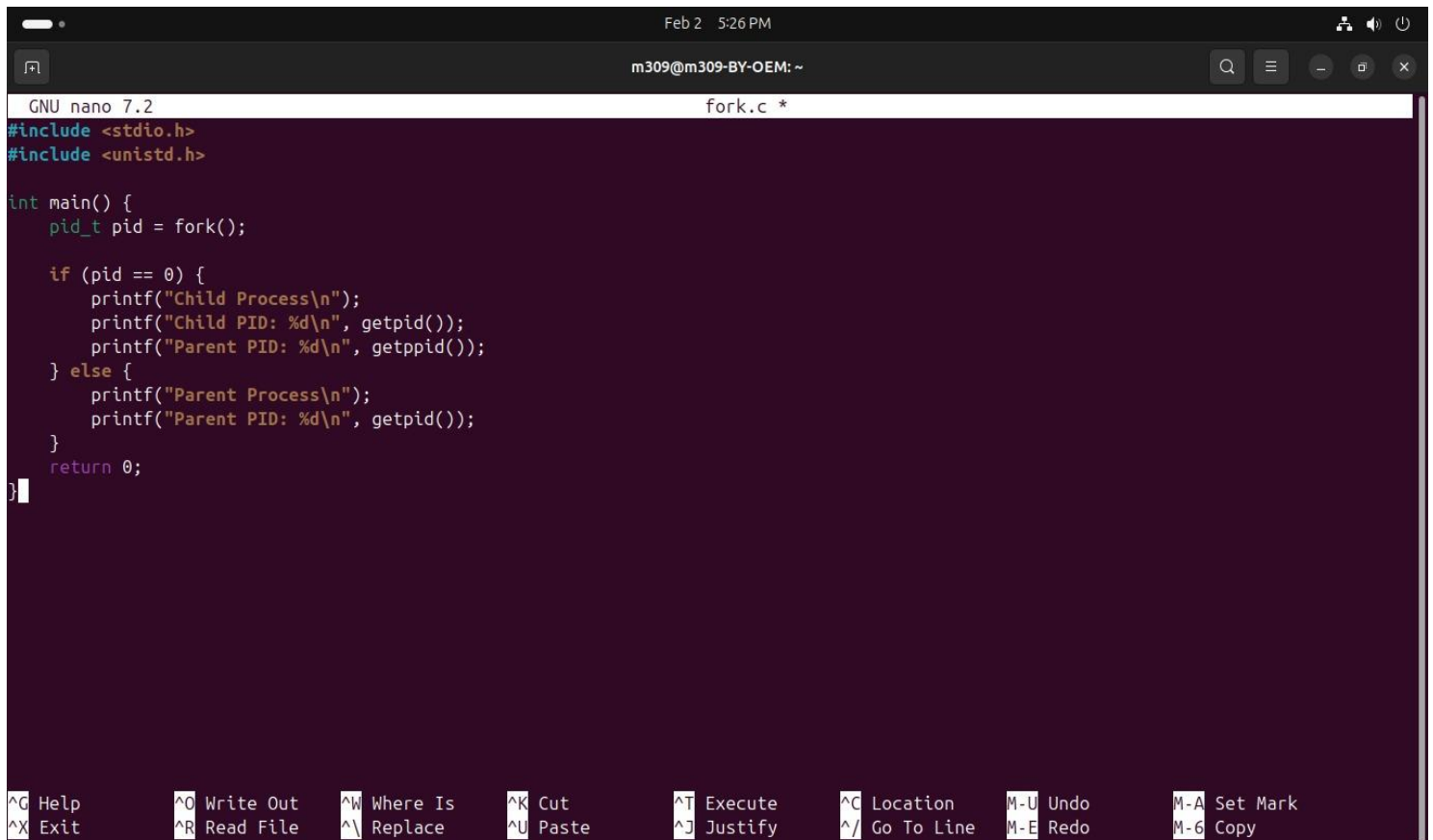
```
GNU nano 7.2 zombie.c
#include <stdio.h>
#include <unistd.h>

int main() {
    int pid = fork();

    if (pid == 0) {
        // Child process
        printf("Child process exiting\n");
    } else {
        // Parent process
        sleep(10);
        printf("Parent process running\n");
    }
    return 0;
}
```

```
m309@m309-BY-OEM:~$ nano zombie.c
m309@m309-BY-OEM:~$ gcc zombie.c -o zombie
m309@m309-BY-OEM:~$ ./zombie
Child process exiting
Parent process running
m309@m309-BY-OEM:~$
```

### 3. the process using fork () system call.



```
GNU nano 7.2                                fork.c *
#include <stdio.h>
#include <unistd.h>

int main() {
    pid_t pid = fork();

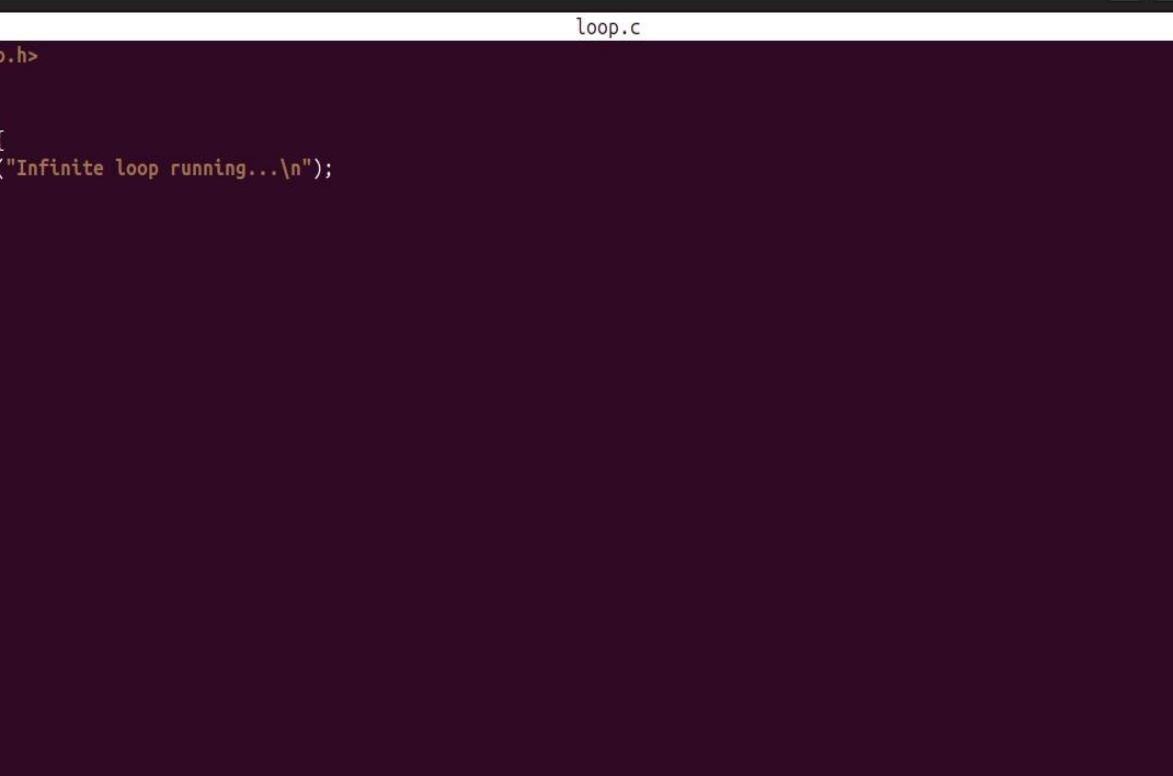
    if (pid == 0) {
        printf("Child Process\n");
        printf("Child PID: %d\n", getpid());
        printf("Parent PID: %d\n", getppid());
    } else {
        printf("Parent Process\n");
        printf("Parent PID: %d\n", getpid());
    }
    return 0;
}
```

^C Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location M-U Undo M-A Set Mark  
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^\_/ Go To Line M-E Redo M-G Copy



```
m309@m309-BY-OEM:~$
m309@m309-BY-OEM:~$ nano fork.c
m309@m309-BY-OEM:~$ gcc fork.c -o fork
m309@m309-BY-OEM:~$ ./fork
Parent Process
Parent PID: 9727
Child Process
Child PID: 9728
Parent PID: 9727
m309@m309-BY-OEM:~$
```

- Infinite loop on fork




```
GNU nano 7.2 loop.c
#include <stdio.h>

int main() {
    while (1) {
        printf("Infinite loop running...\n");
    }
    return 0;
}
```

[ Read 8 lines ]

^O Help	^O Write Out	^W Where Is	^K Cut	^T Execute	^C Location	M-U Undo	M-A Set Mark
^X Exit	^R Read File	^_ Replace	^U Paste	^J Justify	^/ Go To Line	M-E Redo	M-6 Copy



The screenshot shows a terminal window with a dark background and light-colored text. The window title bar at the top indicates the date and time as "Feb 2 5:29 PM". The terminal prompt is "m309@m309-BY-OEM: ~". The output of the command is a continuous loop of the text "Infinite loop running..." displayed on multiple lines. The window includes standard macOS window controls (minimize, maximize, close) and a search bar in the top right corner.