# National Textile University

## Department of Computer Science

Subject:

Operating System

Submitted to:

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Submitted by:

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Reg. number:

23-NTU-CS-FL-1132

Semester:

5th - A

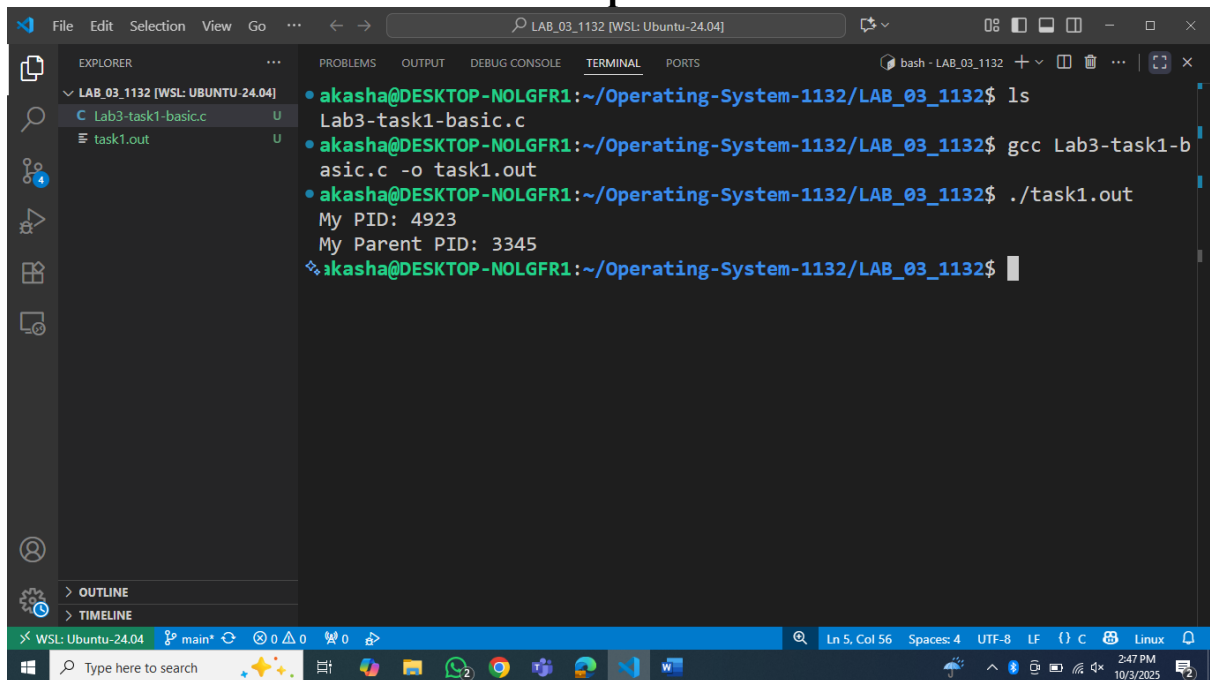# LAB_03

**Task_01: Print PID and PPID:**

## CODE:

```c
// Print PID and PPID
#include <stdio.h>
#include <unistd.h>

int main() {
    printf("My PID: %d\n", getpid());    // get process ID
    printf("My Parent PID: %d\n", getppid()); // get parent process ID
    return 0;
}
```

## Output:



**Task_02: Fork-Creating Child Process:**

## CODE:

```c
// Fork - Creating child Process
#include <stdio.h>
#include <sys/types.h>
#include <unistd.h>

int main() {
    pid_t pid = fork();
    if (pid == 0) {    // This block runs in the child process
        printf("Child: PID=%d, Parent=%d\n", getpid(), getppid());
    } else {           // This block runs in the parent process
        printf("Parent: PID=%d, Child=%d\n", getpid(), pid);
```

```
        }
    return 0;
    }
```

**Output:**



## Task_03: Excel Replacing a Process:

**CODE:**

```c
// Excel replacing a process
#include <stdio.h>
#include <sys/types.h>
#include <unistd.h>

int main() {
    pid_t pid = fork();
    if (pid == 0) {
        execlp("ls", "ls", "-l", NULL);
        printf("This will not print if exec succeeds.\n");
    }
    else {
        printf("Parent still running...\n");
    }
    return 0;
}
```

**Output:**

## Task_04: Wait Schronaization:

**CODE:**

```c
// Wait Schronaizations
#include <stdio.h>
#include <unistd.h>
#include <sys/wait.h>

int main() {
    pid_t pid = fork();
    if (pid == 0) {
        execlp("ls", "ls", "-l", NULL);
        printf("This will not print if exec succeeds.\n");
    }
    else {
        waitpid(pid, NULL, 0);      // Wait for the child process to finish
        printf("Parent still running...\n");
    }
    return 0;
}
```
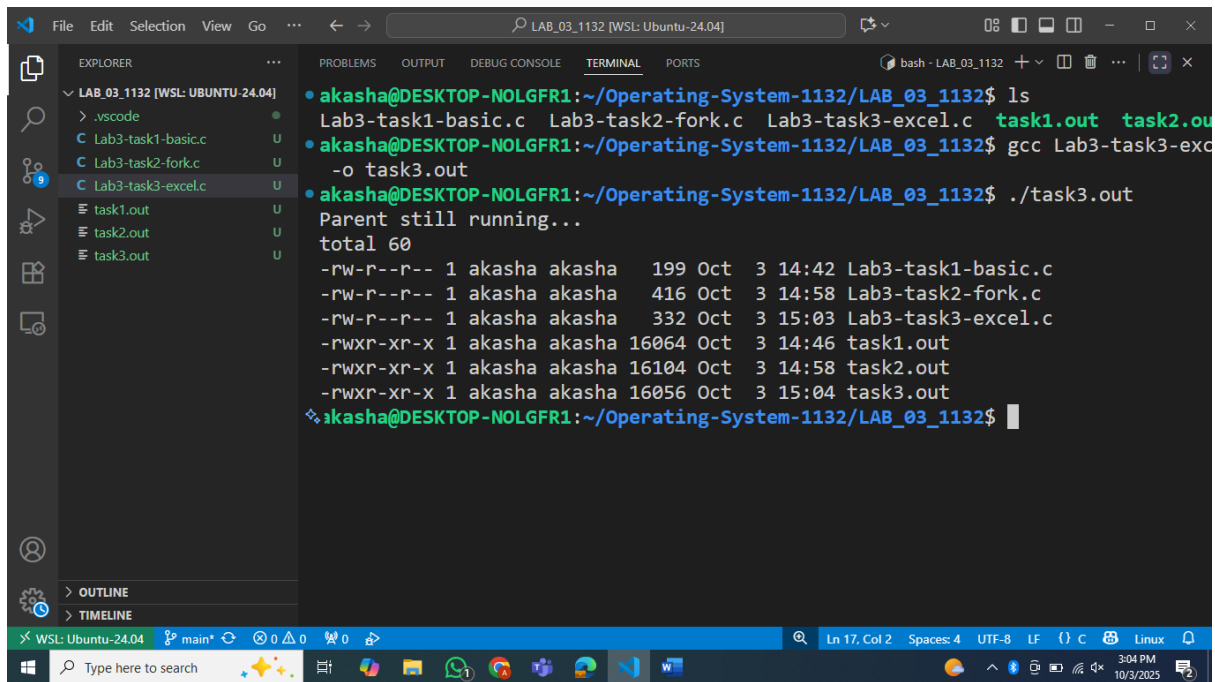
**Output:**

| Imp Notes: |
| --- |
| The difference of using **wait()** and without using it is that by using **wait()** parent pauses while the child finishes while without wait() parent continues. |

# Linux Process Commands

**Terminal 1: akasha@DESKTOP-NOLGFR1: ~**

```
akasha@DESKTOP-NOLGFR1:~$ ps -ef | grep akasha
akasha       359       1  0 14:10 ?        00:00:01 /usr/lib/systemd/systemd --user
akasha       360     359  0 14:10 ?        00:00:00 (sd-pam)
akasha       393     237  0 14:10 pts/1    00:00:00 -bash
akasha      2264    2263  0 14:30 pts/0    00:00:00 sh -c "$VSCODE_WSL_EXT_LOCATION/scripts/wslServer.sh" e3a5acfb517a443235981655413d566533107e92 stable code-server .v
scode-server --host=127.0.0.1 --port=0 --connection-token=29367858-348154018-2511259970-2607556025 --use-host-proxy --without-browser-env-var --disable-websocket-compre
ssion --accept-server-license-terms --telemetry-level=all
akasha      2265    2264  0 14:30 pts/0    00:00:00 sh /mnt/c/Users/abc/.vscode/extensions/ms-vscode-remote.remote-wsl-0.104.3/scripts/wslServer.sh e3a5acfb517a44323598
1655413d566533107e92 stable code-server .vscode-server --host=127.0.0.1 --port=0 --connection-token=29367858-348154018-2511259970-2607556025 --use-host-proxy --without-
browser-env-var --disable-websocket-compression --accept-server-license-terms --telemetry-level=all
akasha      2271    2265  0 14:30 pts/0    00:00:00 sh /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/bin/code-server --host=127.0.0.1 --port=
0 --connection-token=29367858-348154018-2511259970-2607556025 --use-host-proxy --without-browser-env-var --disable-websocket-compression --accept-server-license-terms -
-telemetry-level=all
akasha      2275    2271  0 14:30 pts/0    00:00:28 /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/akasha/.vscode-server/bin/e3a5ac
fb517a443235981655413d566533107e92/out/server-main.js --host=127.0.0.1 --port=0 --connection-token=29367858-348154018-2511259970-2607556025 --use-host-proxy --without-b
rowser-env-var --disable-websocket-compression --accept-server-license-terms --telemetry-level=all
akasha      2288    2287  0 14:30 pts/2    00:00:06 /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node -e const net = require('net'); process
.stdin.pause(); const client = net.createConnection({ host: '127.0.0.1', port: 44153 }, () => { client.pipe(process.stdout); process.stdin.pipe(client); }); client.on('
close', function (hadError) { console.error(hadError ? 'Remote close with error' : 'Remote close'); process.exit(hadError ? 1 : 0); }); client.on('error', function (err
) { process.stderr.write(err && (err.stack || err.message) || String(err)); });
akasha      2297    2296  0 14:30 pts/3    00:00:12 /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node -e const net = require('net'); process
.stdin.pause(); const client = net.createConnection({ host: '127.0.0.1', port: 44153 }, () => { client.pipe(process.stdout); process.stdin.pipe(client); }); client.on('
close', function (hadError) { console.error(hadError ? 'Remote close with error' : 'Remote close'); process.exit(hadError ? 1 : 0); }); client.on('error', function (err
) { process.stderr.write(err && (err.stack || err.message) || String(err)); });
akasha      2317    2275  0 14:30 pts/0    00:00:01 /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/akasha/.vscode-server/bin/e3a5ac
fb517a443235981655413d566533107e92/out/bootstrap-fork --type=fileWatcher
akasha      2335    2275 11 14:30 pts/0    00:06:31 /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node --dns-result-order=ipv4first /home/aka
sha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/out/bootstrap-fork --type=extensionHost --transformURIs --useHostProxy=true
akasha      2964    2335  1 14:35 pts/0    00:00:34 /home/akasha/.vscode-server/extensions/ms-vscode.cpptools-1.27.7-linux-x64/bin/cpptools
akasha      3334    2275  0 14:39 pts/0    00:00:15 /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/akasha/.vscode-server/bin/e3a5ac
fb517a443235981655413d566533107e92/out/bootstrap-fork --type=ptyHost --logsPath /home/akasha/.vscode-server/data/logs/20251003T143022
akasha      3345    3334  0 14:39 pts/4    00:00:00 /bin/bash --init-file /home/akasha/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/out/vs/workbench/cont
rib/terminal/common/scripts/shellIntegration-bash.sh
akasha      5834    2263  0 14:56 pts/0    00:00:01 /home/akasha/.vscode-server/extensions/ms-vscode.cpptools-1.27.7-linux-x64/bin/cpptools-srv 2964 {DDAE951B-BD46-422F
-85EB-338F743BB542}
akasha      7135    2263  0 15:06 pts/0    00:00:01 /home/akasha/.vscode-server/extensions/ms-vscode.cpptools-1.27.7-linux-x64/bin/cpptools-srv 2964 {47AA10B8-F261-4B6D
-ADA8-77D7233114B2}
akasha      8794    8792  0 15:25 pts/5    00:00:00 -bash
akasha      8891    8794  0 15:26 pts/5    00:00:00 ps -ef
akasha      8892    8794  0 15:26 pts/5    00:00:00 grep --color=auto akasha
akasha@DESKTOP-NOLGFR1:~$
```

**Terminal 2: Select akasha@DESKTOP-NOLGFR1: ~**

```
akasha@DESKTOP-NOLGFR1:~$ top
top - 15:29:57 up  1:21,  1 user,  load average: 0.57, 0.34, 0.21
Tasks:  42 total,   1 running,  41 sleeping,   0 stopped,   0 zombie
%Cpu(s): 11.3 us, 13.2 sy,  0.0 ni, 73.6 id,  0.0 wa,  0.0 hi,  1.9 si,  0.0 st
MiB Mem :   1860.2 total,    117.3 free,   1344.3 used,    484.8 buff/cache
MiB Swap:   1024.0 total,   1019.7 free,      4.3 used,    516.0 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
      1 root      20   0   21788  12120   9304 S   0.0   0.6   0:10.97 systemd
      2 root      20   0    3072   1792   1664 S   0.0   0.1   0:00.81 init-systemd(Ub
      7 root      20   0    3104   1904   1792 S   0.0   0.1   0:00.15 init
     55 root      19  -1   50424  13952  12928 S   0.0   0.7   0:02.15 systemd-journal
    109 root      20   0   25272   5888   4480 S   0.0   0.3   0:03.03 systemd-udevd
    123 systemd+  20   0   21456  12800  10752 S   0.0   0.7   0:01.21 systemd-resolve
    127 systemd+  20   0   91024   7680   6912 S   0.0   0.4   0:01.06 systemd-timesyn
    176 root      20   0    4236   2560   2432 S   0.0   0.1   0:00.09 cron
    177 message+  20   0    9636   5120   4608 S   0.0   0.3   0:00.66 dbus-daemon
    184 root      20   0   17968   8448   7552 S   0.0   0.4   0:00.62 systemd-logind
    186 root      20   0 1756096  12288   9856 S   0.0   0.6   0:01.71 wsl-pro-service
    188 syslog    20   0  222508   5504   4608 S   0.0   0.3   0:00.70 rsyslogd
    191 root      20   0    3160   2048   1920 S   0.0   0.1   0:00.10 agetty
    207 root      20   0    3116   1920   1792 S   0.0   0.1   0:00.07 agetty
    223 root      20   0  107032  18944   9600 S   0.0   1.0   0:01.26 unattended-upgr
    237 root      20   0    6820   3840   3712 S   0.0   0.2   0:00.19 login
    359 akasha    20   0   20112  10880   9088 S   0.0   0.6   0:01.01 systemd
    360 akasha    20   0   21148   2236   1792 S   0.0   0.1   0:00.00 (sd-pam)
    393 akasha    20   0    6072   3840   2304 S   0.0   0.2   0:00.20 bash
   2262 root      20   0    3076    896    896 S   0.0   0.0   0:00.00 SessionLeader
   2263 root      20   0    3092   1024   1024 S   0.0   0.1   0:00.01 Relay(2264)
   2264 akasha    20   0    2800   1664   1664 S   0.0   0.1   0:00.01 sh
   2275 akasha    20   0   11.3g 104336  53120 S   0.0   5.5   0:29.21 node
```

```
akasha@DESKTOP-NOLGFR1:~$ sleep 5
akasha@DESKTOP-NOLGFR1:~$ sleep 5 &
[1] 9534
akasha@DESKTOP-NOLGFR1:~$ top
top - 15:35:26 up  1:26,  1 user,  load average: 0.29, 0.23, 0.19
Tasks:  42 total,   1 running,  41 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.2 us,  0.3 sy,  0.0 ni, 99.4 id,  0.1 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   1860.2 total,    113.9 free,   1347.0 used,    485.2 buff/cache
MiB Swap:   1024.0 total,   1019.7 free,      4.3 used.    513.2 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   9541 akasha    20   0    9300   5632   3456 R   0.7   0.3   0:00.09 top
   2275 akasha    20   0   11.3g 104336  53120 S   0.3   5.5   0:29.76 node
   2335 akasha    20   0   52.6g 838184  56832 S   0.3  44.0   6:51.66 node
   9261 root      20   0    3092   1024   1024 S   0.3   0.1   0:00.06 Relay(9265)
      1 root      20   0   21788  12120   9304 S   0.0   0.6   0:10.99 systemd
      2 root      20   0    3072   1792   1664 S   0.0   0.1   0:00.81 init-systemd(Ub
      7 root      20   0    3104   1904   1792 S   0.0   0.1   0:00.15 init
     55 root      19  -1   50424  14080  13056 S   0.0   0.7   0:02.19 systemd-journal
    109 root      20   0   25272   5888   4480 S   0.0   0.3   0:03.10 systemd-udevd
    123 systemd+  20   0   21456  12800  10752 S   0.0   0.7   0:01.21 systemd-resolve
    127 systemd+  20   0   91024   7680   6912 S   0.0   0.4   0:01.06 systemd-timesyn
    176 root      20   0    4236   2560   2432 S   0.0   0.1   0:00.09 cron
    177 message+  20   0    9636   5120   4608 S   0.0   0.3   0:00.66 dbus-daemon
    184 root      20   0   17968   8448   7552 S   0.0   0.4   0:00.63 systemd-logind
    186 root      20   0 1756096  12288   9856 S   0.0   0.6   0:01.71 wsl-pro-service
    188 syslog    20   0  222508   5504   4608 S   0.0   0.3   0:00.71 rsyslogd
    191 root      20   0    3160   2048   1920 S   0.0   0.1   0:00.10 agetty
    207 root      20   0    3116   1920   1792 S   0.0   0.1   0:00.07 agetty
    223 root      20   0  107032  18944   9600 S   0.0   1.0   0:01.26 unattended-upgr
    237 root      20   0    6820   3840   3712 S   0.0   0.2   0:00.19 login
    359 akasha    20   0   20112  10880   9088 S   0.0   0.6   0:01.01 systemd
    360 akasha    20   0   21148   2236   1792 S   0.0   0.1   0:00.00 (sd-pam)
    393 akasha    20   0    6072   3840   2304 S   0.0   0.2   0:00.20 bash
   2262 root      20   0    3076    896    896 S   0.0   0.0   0:00.00 SessionLeader
   2263 root      20   0    3092   1024   1024 S   0.0   0.1   0:00.01 Relay(2264)
   2264 akasha    20   0    2800   1664   1664 S   0.0   0.1   0:00.01 sh
   2265 akasha    20   0    2800   1792   1792 S   0.0   0.1   0:00.02 sh
   2271 akasha    20   0    2800   1792   1792 S   0.0   0.1   0:00.00 sh
   2286 root      20   0    3088    896    896 S   0.0   0.0   0:00.00 SessionLeader
   2287 root      20   0    3088   1024   1024 S   0.0   0.1   0:01.60 Relay(2288)
   2288 akasha    20   0 1022444  65792  44032 S   0.0   3.5   0:06.88 node
   2295 root      20   0    3088    896    896 S   0.0   0.0   0:00.00 SessionLeader
   2296 root      20   0    3088   1024   1024 S   0.0   0.1   0:04.35 Relay(2297)
```

```
akasha@DESKTOP-NOLGFR1:~$ sleep 5
akasha@DESKTOP-NOLGFR1:~$ jobs
akasha@DESKTOP-NOLGFR1:~$ sleep 5 &
[1] 9649
akasha@DESKTOP-NOLGFR1:~$ fg 1
sleep 5
akasha@DESKTOP-NOLGFR1:~$ pidof sleep
akasha@DESKTOP-NOLGFR1:~$ fg %1
-bash: fg: %1: no such job
akasha@DESKTOP-NOLGFR1:~$ pidof sleep
akasha@DESKTOP-NOLGFR1:~$ sleep 5 &
[1] 9748
akasha@DESKTOP-NOLGFR1:~$ pidof sleep
[1]+  Done                    sleep 5
akasha@DESKTOP-NOLGFR1:~$ yes > /dev/null &
[1] 9880
akasha@DESKTOP-NOLGFR1:~$ top
top - 15:39:49 up  1:31,  1 user,  load average: 0.35, 0.18, 0.17
Tasks:  43 total,   2 running,  41 sleeping,   0 stopped,   0 zombie
%Cpu(s): 14.6 us,  9.8 sy,  0.0 ni, 73.2 id,  0.0 wa,  0.0 hi,  2.4 si,  0.0 st
MiB Mem :   1860.2 total,    111.4 free,   1348.8 used,    485.8 buff/cache
MiB Swap:   1024.0 total,   1019.7 free,      4.3 used.    511.4 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   9880 akasha    20   0    3124   1536   1536 R  90.9   0.1   0:23.31 yes
   2275 akasha    20   0   11.3g 104336  53120 S   9.1   5.5   0:30.54 node
      1 root      20   0   21788  12120   9304 S   0.0   0.6   0:11.00 systemd
      2 root      20   0    3072   1792   1664 S   0.0   0.1   0:00.81 init-systemd(Ub
      7 root      20   0    3104   1904   1792 S   0.0   0.1   0:00.15 init
     55 root      19  -1   50424  14080  13056 S   0.0   0.7   0:02.22 systemd-journal
    109 root      20   0   25272   5888   4480 S   0.0   0.3   0:03.12 systemd-udevd
    123 systemd+  20   0   21456  12800  10752 S   0.0   0.7   0:01.21 systemd-resolve
    127 systemd+  20   0   91024   7680   6912 S   0.0   0.4   0:01.07 systemd-timesyn
    176 root      20   0    4236   2560   2432 S   0.0   0.1   0:00.09 cron
    177 message+  20   0    9636   5120   4608 S   0.0   0.3   0:00.66 dbus-daemon
    184 root      20   0   17968   8448   7552 S   0.0   0.4   0:00.63 systemd-logind
    186 root      20   0 1756096  12288   9856 S   0.0   0.6   0:01.72 wsl-pro-service
    188 syslog    20   0  222508   5504   4608 S   0.0   0.3   0:00.72 rsyslogd
    191 root      20   0    3160   2048   1920 S   0.0   0.1   0:00.10 agetty
    207 root      20   0    3116   1920   1792 S   0.0   0.1   0:00.07 agetty
    223 root      20   0  107032  18944   9600 S   0.0   1.0   0:01.26 unattended-upgr
    237 root      20   0    6820   3840   3712 S   0.0   0.2   0:00.19 login
    359 akasha    20   0   20112  10880   9088 S   0.0   0.6   0:01.01 systemd
    360 akasha    20   0   21148   2236   1792 S   0.0   0.1   0:00.00 (sd-pam)
```

```
akasha@DESKTOP-NOLGFR1:~$ sleep 5
akasha@DESKTOP-NOLGFR1:~$ sleep 5 &
[1] 10232
akasha@DESKTOP-NOLGFR1:~$ pidof sleep
[1]+  Done                    sleep 5
akasha@DESKTOP-NOLGFR1:~$ ps -ef | grep firefox
akasha      10271    9265  0 15:44 pts/5    00:00:00 grep --color=auto firefox
akasha@DESKTOP-NOLGFR1:~$ killall sleep
sleep: no process found
akasha@DESKTOP-NOLGFR1:~$ sleep 5
akasha@DESKTOP-NOLGFR1:~$ killall sleep
sleep: no process found
akasha@DESKTOP-NOLGFR1:~$ yes > /dev/null &
[1] 10360
akasha@DESKTOP-NOLGFR1:~$ ps -ef | grep yes
akasha      10360    9265 99 15:45 pts/5    00:00:19 yes
akasha      10387    9265  0 15:45 pts/5    00:00:00 grep --color=auto yes
akasha@DESKTOP-NOLGFR1:~$ kill -9 10360
akasha@DESKTOP-NOLGFR1:~$ top
top - 15:46:28 up  1:37,  1 user,  load average: 0.66, 0.31, 0.22
Tasks:  42 total,   1 running,  41 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,  2.3 sy,  0.0 ni, 97.7 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   1860.2 total,    114.8 free,   1344.8 used,    486.5 buff/cache
MiB Swap:   1024.0 total,   1019.7 free,      4.3 used.    515.5 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
  10436 akasha    20   0    9300   5376   3200 R   9.1   0.3   0:00.02 top
      1 root      20   0   21788  12120   9304 S   0.0   0.6   0:11.02 systemd
      2 root      20   0    3072   1792   1664 S   0.0   0.1   0:00.81 init-systemd(Ub
      7 root      20   0    3104   1904   1792 S   0.0   0.1   0:00.15 init
     55 root      19  -1   50424  14080  13056 S   0.0   0.7   0:02.25 systemd-journal
    109 root      20   0   25272   5888   4480 S   0.0   0.3   0:03.14 systemd-udevd
    123 systemd+  20   0   21456  12800  10752 S   0.0   0.7   0:01.21 systemd-resolve
    127 systemd+  20   0   91024   7680   6912 S   0.0   0.4   0:01.07 systemd-timesyn
    176 root      20   0    4236   2560   2432 S   0.0   0.1   0:00.09 cron
    177 message+  20   0    9636   5120   4608 S   0.0   0.3   0:00.68 dbus-daemon
    184 root      20   0   17968   8448   7552 S   0.0   0.4   0:00.63 systemd-logind
    186 root      20   0 1756096  12288   9856 S   0.0   0.6   0:01.75 wsl-pro-service
    188 syslog    20   0  222508   5504   4608 S   0.0   0.3   0:00.74 rsyslogd
    191 root      20   0    3160   2048   1920 S   0.0   0.1   0:00.10 agetty
    207 root      20   0    3116   1920   1792 S   0.0   0.1   0:00.07 agetty
    223 root      20   0  107032  18944   9600 S   0.0   1.0   0:01.26 unattended-upgr
    237 root      20   0    6820   3840   3712 S   0.0   0.2   0:00.19 login
    359 akasha    20   0   20112  10880   9088 S   0.0   0.6   0:01.01 systemd
```