



National Textile University
Department of Computer Science

Subject:

Operating System

Submitted to:

Sir Nasir

Submitted by:

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Reg number:

1129

Lab no. :

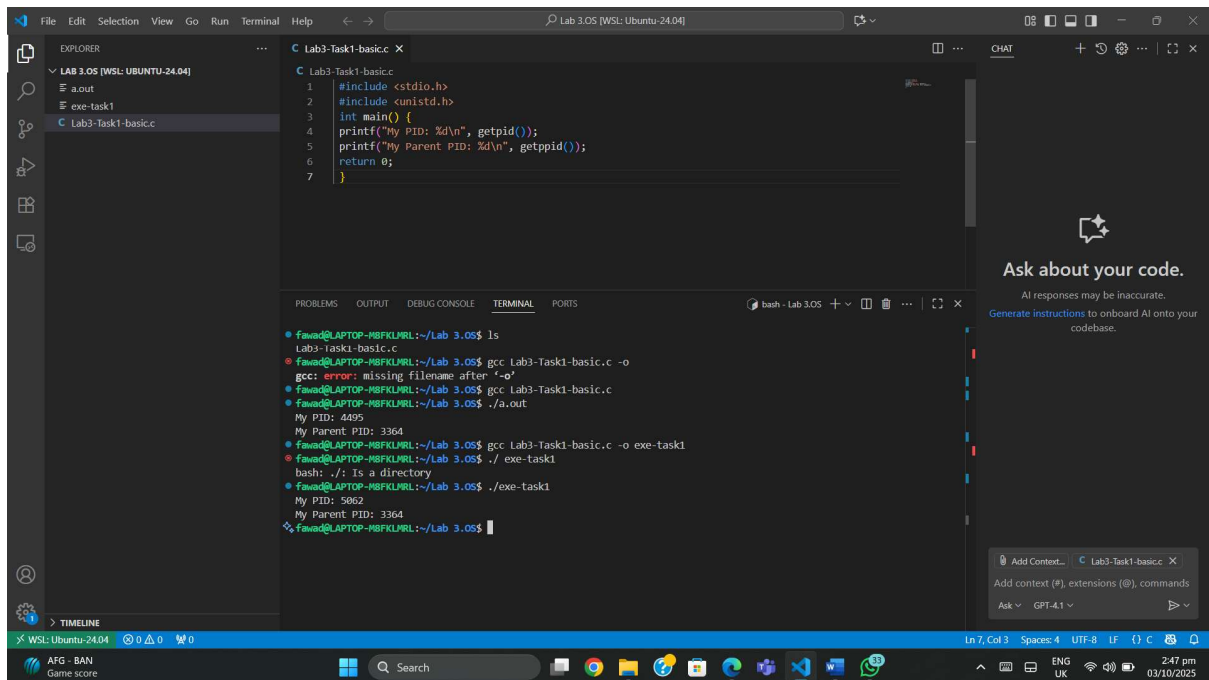
03 Calss Work

Semester:

5th

Task1:

Compile and Run Basic File



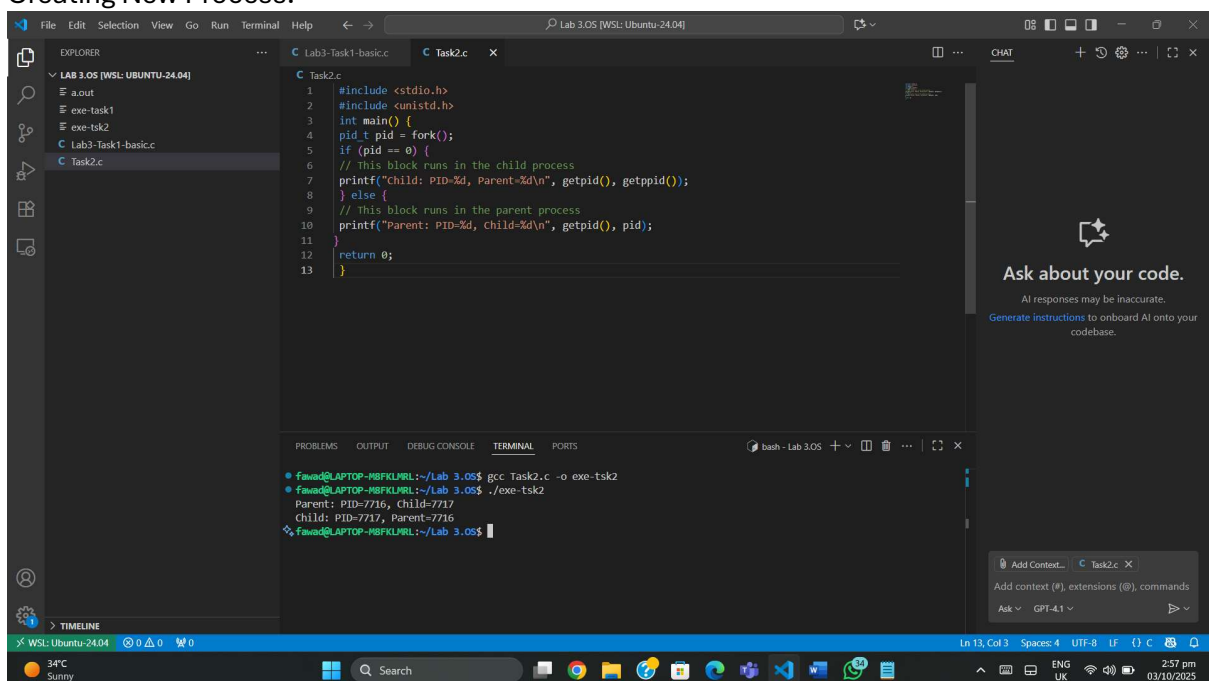
```
1 #include <stdio.h>
2 #include <unistd.h>
3 int main() {
4     printf("My PID: %d\n", getpid());
5     printf("My Parent PID: %d\n", getppid());
6     return 0;
7 }
```

```
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ ls
Lab3-Task1-basic.c
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ gcc Lab3-Task1-basic.c -o
gcc: error: missing filename after '-o'
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ gcc Lab3-Task1-basic.c
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ ./a.out
My PID: 4495
My Parent PID: 3364
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ gcc Lab3-Task1-basic.c -o exe-task1
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ ./exe-task1
bash: ./: Is a directory
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ ./exe-task1
My PID: 5062
My Parent PID: 3364
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$
```

Task2:

Parent And child id:

Creating New Process:

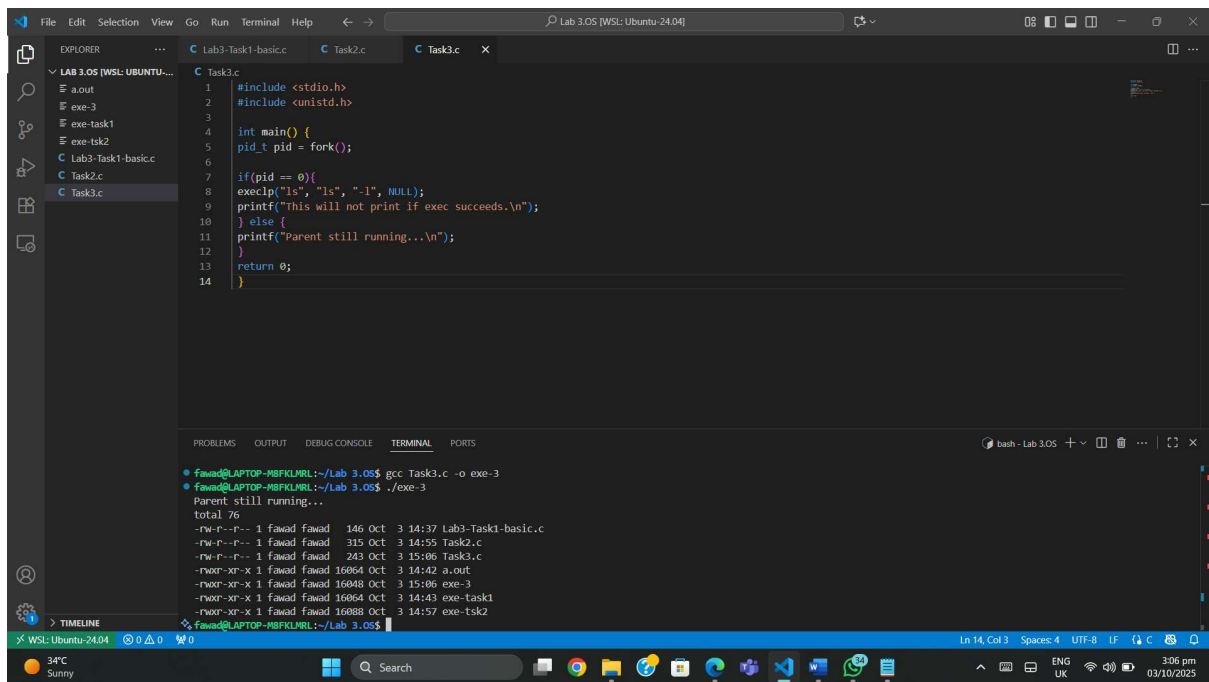


```
1 #include <stdio.h>
2 #include <unistd.h>
3 int main() {
4     pid_t pid = fork();
5     if (pid == 0) {
6         // this block runs in the child process
7         printf("Child: PID=%d, Parent=%d\n", getpid(), getppid());
8     } else {
9         // this block runs in the parent process
10        printf("Parent: PID=%d, child=%d\n", getpid(), pid);
11    }
12    return 0;
13 }
```

```
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ gcc Task2.c -o exe-tsk2
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$ ./exe-tsk2
Parent: PID=7716, Child=7717
Child: PID=7717, Parent=7716
fawad@LAPTOP-M8FKLMRL:~/Lab 3.05$
```

Task3:

Process Terminate without wait child process completed



The screenshot shows a Visual Studio Code editor with a file explorer on the left and a terminal at the bottom. The file explorer shows a project named 'LAB 3.05 [WSL: UBUNTU-24.04]' with files 'a.out', 'exe-3', 'exe-task1', 'exe-task2', 'Lab3-Task1-basic.c', 'Task2.c', and 'Task3.c'. The 'Task3.c' file is open in the editor, showing the following code:

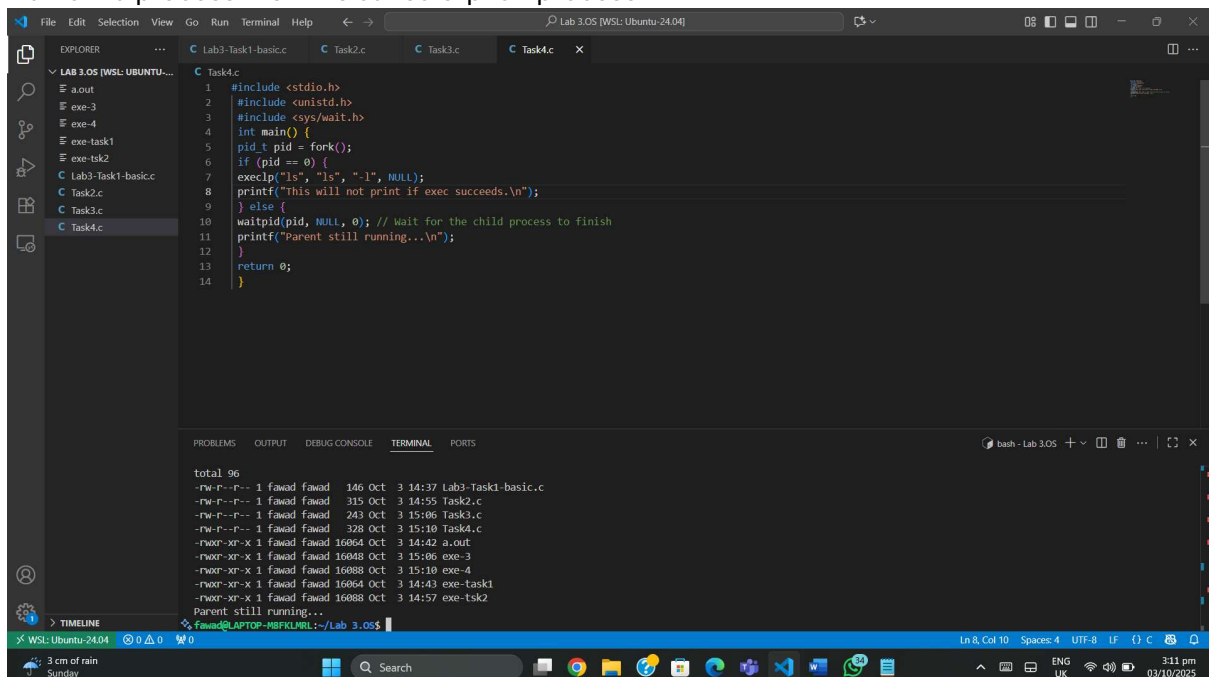
```
1 #include <stdio.h>
2 #include <unistd.h>
3
4 int main() {
5     pid_t pid = fork();
6
7     if(pid == 0){
8         execlp("ls", "ls", "-l", NULL);
9         printf("This will not print if exec succeeds.\n");
10    } else {
11        printf("Parent still running...\n");
12    }
13    return 0;
14 }
```

The terminal at the bottom shows the execution of the program. It starts with the command 'gcc Task3.c -o exe-3' and then 'fawad@LAPTOP-MBFXLMRL:~/Lab 3.05\$./exe-3'. The output shows 'Parent still running...' followed by a 'total 76' line and a list of files and directories. The terminal also shows the execution of 'ls' in the child process, which prints the directory contents.

Task4:

With wait:

If we use Wait parent will be wait until child process complete if we not use it parent can not wait child process then it is called orphan process



The screenshot shows a Visual Studio Code editor with a file explorer on the left and a terminal at the bottom. The file explorer shows a project named 'LAB 3.05 [WSL: UBUNTU-24.04]' with files 'a.out', 'exe-3', 'exe-4', 'exe-task1', 'exe-task2', 'Lab3-Task1-basic.c', 'Task2.c', 'Task3.c', and 'Task4.c'. The 'Task4.c' file is open in the editor, showing the following code:

```
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4
5 int main() {
6     pid_t pid = fork();
7
8     if(pid == 0){
9         execlp("ls", "ls", "-l", NULL);
10    } else {
11        waitpid(pid, NULL, 0); // Wait for the child process to finish
12        printf("Parent still running...\n");
13    }
14    return 0;
15 }
```

The terminal at the bottom shows the execution of the program. It starts with the command 'gcc Task4.c -o exe-4' and then 'fawad@LAPTOP-MBFXLMRL:~/Lab 3.05\$./exe-4'. The output shows 'Parent still running...' followed by a 'total 96' line and a list of files and directories. The terminal also shows the execution of 'ls' in the child process, which prints the directory contents.

Commands:

Ps command is use to show current process :

```
fawad@LAPTOP-M8FKLMRL:~$ ps
  PID TTY          TIME CMD
 11933 pts/5    00:00:00 bash
 12278 pts/5    00:00:00 ps
fawad@LAPTOP-M8FKLMRL:~$
```

Ps-ef command is use to show full list of all processes it can return terminal it can not show real time processes

```
fawad@LAPTOP-M8FKLMRL:~$ ps -ef
UID          PID    PPID  C   STIME TTY          TIME CMD
root           1        0  0   14:22 ?        00:00:01 /sbin/init
root           2        1  0   14:22 ?        00:00:00 /init
root           8        2  0   14:22 ?        00:00:00 plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10 --log-truncate
root          44         1  0   14:22 ?        00:00:00 /usr/lib/systemd/systemd-journald
root          94         1  0   14:22 ?        00:00:00 /usr/lib/systemd/systemd-udevd
systemd+     150         1  0   14:22 ?        00:00:00 /usr/lib/systemd/systemd-resolved
systemd+     151         1  0   14:22 ?        00:00:00 /usr/lib/systemd/systemd-timesyncd
root         163         1  0   14:22 ?        00:00:00 /usr/sbin/cron -f -p
message+    164         1  0   14:22 ?        00:00:00 @dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-only
root        180         1  0   14:22 ?        00:00:00 /usr/lib/systemd/systemd-logind
root        191         1  0   14:22 ?        00:00:00 /usr/libexec/wsl-pro-service -vv
root        195         1  0   14:22 hvc0     00:00:00 /sbin/agetty -o -p -- \u --noclear --keep-baud - 115200,38400,9600 vt220
syslog      201         1  0   14:22 ?        00:00:00 /usr/sbin/rsyslogd -n -iNONE
root        205         1  0   14:22 tty1     00:00:00 /sbin/agetty -o -p -- \u --noclear - linux
root        211         1  0   14:22 ?        00:00:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
root        319         2  0   14:22 pts/1    00:00:00 /bin/login -f
fawad       367         1  0   14:23 ?        00:00:00 /usr/lib/systemd/systemd --user
fawad       368       367  0   14:23 ?        00:00:00 (sd-pam)
fawad       385       319  0   14:23 pts/1    00:00:00 -bash
root        443         2  0   14:23 ?        00:00:00 /init
root        444       443  0   14:23 ?        00:00:00 /init
fawad       445       444  0   14:23 pts/0     00:00:00 sh -c "$VSCODE_WSL_EXT_LOCATION/scripts/wslServer.sh" e3a5acfb517a443235981655413d566533107e92 stable co
fawad       446       445  0   14:23 pts/0     00:00:00 sh /mnt/c/Users/Ahmad Fawad/.vscode/extensions/ms-vscode-remote.remote-wsl-0.104.3/scripts/wslServer.sh
fawad       452       446  0   14:23 pts/0     00:00:00 sh /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/bin/code-server --host=127.0.
fawad       456       452  0   14:23 pts/0     00:00:17 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/fawad/.vscode-server/
fawad       939       456  0   14:25 pts/0     00:00:08 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/fawad/.vscode-server/
root       2569         2  0   14:34 ?        00:00:00 /init
root       2570       2569  0   14:34 ?        00:00:00 /init
fawad       2577       2570  0   14:34 pts/2     00:00:02 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node -e const net = require('net
root       2584         2  0   14:34 ?        00:00:00 /init
root       2585       2584  0   14:34 ?        00:00:00 /init
fawad       2586       2585  0   14:34 pts/3     00:00:02 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node -e const net = require('net
fawad       2593       456  0   14:34 pts/0     00:00:01 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/fawad/.vscode-server/
fawad       2604       456  3   14:34 pts/0     00:01:54 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node --dns-result-order=ipv4firs
fawad       7090       939  0   14:55 pts/4     00:00:00 /bin/bash --init-file /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/out/vs/wor
root      11927         2  0   15:18 ?        00:00:00 /init
root      11929     11927  0   15:18 ?        00:00:00 /init
fawad     11933     11929  0   15:18 pts/5     00:00:00 -bash
fawad     12617     11933  0   15:22 pts/5     00:00:00 ps -ef
```

Ps -ef | grep fawad command is used to pipe for input of next process

```
fawad@LAPTOP-M8FKLMRL:~$ ps -ef | grep fawad
fawad 367      1   0 14:23 ?        00:00:00 /usr/lib/systemd/systemd --user
fawad 368      367   0 14:23 ?        00:00:00 (sd-pam)
fawad 385      319   0 14:23 pts/1    00:00:00 -bash
fawad 445      444   0 14:23 pts/0    00:00:00 sh -c "$VSCODE_WSL_EXT_LOCATION/scripts/wslServer.sh" e3a5acfb517a443235981655413d566533107e92 stable co
de-server .vscode-server --host=127.0.0.1 --port=0 --connection-token=3482651142-2291255010-2775284308-4245423698 --use-host-proxy --without-browser-env-var
--disable-websocket-compression --accept-server-license-terms --telemetry-level=all
fawad 446      445   0 14:23 pts/0    00:00:00 sh /mnt/c/Users/Ahmad Fawad/.vscode/extensions/ms-vscode-remote.remote-wsl-0.104.3/scripts/wslServer.sh
e3a5acfb517a443235981655413d566533107e92 stable code-server .vscode-server --host=127.0.0.1 --port=0 --connection-token=3482651142-2291255010-2775284308-424
5423698 --use-host-proxy --without-browser-env-var --disable-websocket-compression --accept-server-license-terms --telemetry-level=all
fawad 452      446   0 14:23 pts/0    00:00:00 sh /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/bin/code-server --host=127.0.
0.1 --port=0 --connection-token=3482651142-2291255010-2775284308-4245423698 --use-host-proxy --without-browser-env-var --disable-websocket-compression --acc
ept-server-license-terms --telemetry-level=all
fawad 456      452   0 14:23 pts/0    00:00:17 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/fawad/.vscode-server/
bin/e3a5acfb517a443235981655413d566533107e92/out/server-main.js --host=127.0.0.1 --port=0 --connection-token=3482651142-2291255010-2775284308-4245423698 --u
se-host-proxy --without-browser-env-var --disable-websocket-compression --accept-server-license-terms --telemetry-level=all
fawad 939      456   0 14:25 pts/0    00:00:08 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/fawad/.vscode-server/
bin/e3a5acfb517a443235981655413d566533107e92/out/bootstrap-fork --type=ptyHost --logsPath /home/fawad/.vscode-server/data/logs/20251003T142306
fawad 2577      2570   0 14:34 pts/2    00:00:02 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node -e const net = require('net
'); process.stdin.pause(); const client = net.createConnection({ host: '127.0.0.1', port: 34663 }, () => { client.pipe(process.stdout); process.stdin.pipe(c
lient); }); 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)); });
fawad 2586      2585   0 14:34 pts/3    00:00:02 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node -e const net = require('net
'); process.stdin.pause(); const client = net.createConnection({ host: '127.0.0.1', port: 34663 }, () => { client.pipe(process.stdout); process.stdin.pipe(c
lient); }); 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)); });
fawad 2593      456   0 14:34 pts/0    00:00:01 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node /home/fawad/.vscode-server/
bin/e3a5acfb517a443235981655413d566533107e92/out/bootstrap-fork --type=fileWatcher
fawad 2604      456   3 14:34 pts/0    00:01:59 /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/node --dns-result-order=ipv4firs
t /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/out/bootstrap-fork --type=extensionHost --transformURIs --useHostProxy=true
fawad 7090      939   0 14:55 pts/4    00:00:00 /bin/bash --init-file /home/fawad/.vscode-server/bin/e3a5acfb517a443235981655413d566533107e92/out/vs/wor
kbench/contrib/terminal/common/scripts/shellIntegration-bash.sh
fawad 11933      11929   0 15:18 pts/5    00:00:00 -bash
fawad 13891      11933   0 15:25 pts/5    00:00:00 ps -ef
fawad 13892      11933   0 15:25 pts/5    00:00:00 grep --color=auto fawad
fawad@LAPTOP-M8FKLMRL:~$
```

Top command is used to show real time process

```
fawad@LAPTOP-M8FKLMRL:~$ top - 15:29:54 up 1:07, 1 user, load average: 0.02, 0.08, 0.03
Tasks: 39 total, 1 running, 38 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.1 us, 0.2 sy, 0.0 ni, 99.6 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3573.2 total, 2082.5 free, 1342.3 used, 223.6 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 2230.9 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR   S  %CPU  %MEM     TIME+ COMMAND
 2604 fawad      20   0   52.6g  735192  52864  S   2.0  20.1  2:07.00 node
    1 root       0   0   21728  12228   9156  S   0.0   0.3   0:01.40 systemd
    2 root       0   0   30972  1792   1792  S   0.0   0.0   0:00.00 init-systemd(Ub
    8 root       0   0   3112   2156   2048  S   0.0   0.1   0:00.29 init
   44 root      19  -1   50436  15392  14624  S   0.0   0.4   0:00.59 systemd-journal
   94 root       0   0   25808   6816  4864  S   0.0   0.2   0:00.01 systemd-judev
  150 systemd+  20   0   21456  12544  10368  S   0.0   0.3   0:00.26 systemd-resolve
  151 systemd+  20   0   91024   7680   6784  S   0.0   0.2   0:00.25 systemd-timesyn
  163 root       0   0   4236   2688   2432  S   0.0   0.1   0:00.03 cron
  164 message+  20   0   9536   4608   4224  S   0.1   0.0   0:00.25 dbus-daemon
  180 root       0   0   17968   8964   7296  S   0.0   0.2   0:00.19 systemd-logind
  191 root       0   0  1755040  12160  10240  S   0.0   0.3   0:00.44 wsl-pro-service
  195 root       0   0   3160   1920   1792  S   0.0   0.1   0:00.02agetty
  201 syslog     0   0  222508   5632   4480  S   0.0   0.2   0:00.19 rsyslogd
  205 root       0   0   3116   1792   1664  S   0.0   0.0   0:00.01agetty
  211 root       0   0  107012  22272  13184  S   0.0   0.6   0:00.26 unattended-upgr
  319 root       0   0   6820   4352   3712  S   0.0   0.1   0:00.03 login
  367 fawad      20   0  20316  11264   9216  S   0.0   0.3   0:00.23 systemd
  368 fawad      20   0  21148   3516   1792  S   0.0   0.1   0:00.00 (sd-pam)
  385 fawad      20   0   6072   4736   3328  S   0.0   0.1   0:00.04 bash
  443 root       0   0   3088   1032   896  S   0.0   0.0   0:00.00 SessionLeader
  444 root       0   0   3088   1168   1024  S   0.0   0.0   0:00.00 Relay(445)
  445 fawad      20   0   2000   1536   1536  S   0.0   0.0   0:00.03 sh
  446 fawad      20   0   2800   1664   1664  S   0.0   0.0   0:00.00 sh
  452 fawad      20   0   2800   1664   1664  S   0.0   0.0   0:00.00 sh
  456 fawad      20   0  11136  14356   50916  S   3.9   0.7  0:17.82 node
  939 fawad      20   0  1133656  74024  46848  S   2.0   0.9  0:09.41 node
 2569 root       0   0   3080   1032   896  S   0.0   0.0   0:00.00 SessionLeader
 2570 root       0   0   3096   1040   896  S   0.0   0.0   0:00.56 Relay(2577)
 2577 fawad      20   0  1020416  62594  42752  S   1.7   0.2   0:02.56 node
 2584 root       0   0   3080   1032   896  S   0.0   0.0   0:00.00 SessionLeader
 2585 root       0   0   3096   1168   1024  S   0.0   0.0   0:00.54 Relay(2586)
 2586 fawad      20   0  1012308  63528  42496  S   1.5   0.2   0:02.18 node
 2593 fawad      20   0  1261792  68000  46720  S   1.6   0.1   0:01.18 node
 7090 fawad      20   0   6340   5248   3584  S   0.0   0.1   0:00.10 bash
 11927 root      20   0   3088   1032   896  S   0.0   0.0   0:00.00 SessionLeader
 11929 root      20   0   3088   1168   1024  S   0.0   0.0   0:00.00 Relay(11933)
 11933 fawad      20   0   6172   4592   3456  S   0.1   0.0   0:00.39 bash
 13908 fawad      20   0   9436   5504   3328  R   0.0   0.2   0:00.05 top
```

Sleep command is used to slepp the process fg as well as bg

```
fawad@LAPTOP-M8FKLMRL: ~$ jobs
fawad@LAPTOP-M8FKLMRL:~$ sleep 15 &
[1] 14744
fawad@LAPTOP-M8FKLMRL:~$ jobs
[1]+  Running                  sleep 15 &
fawad@LAPTOP-M8FKLMRL:~$ |
```

```
fawad@LAPTOP-M8FKLMRL: ~$ sleep 15 &
[1] 14982
fawad@LAPTOP-M8FKLMRL:~$ fg 1
sleep 15
|
```

```
fawad@LAPTOP-M8FKLMRL: ~$ sleep 15 &
[1] 15097
fawad@LAPTOP-M8FKLMRL: ~$ pidof
fawad@LAPTOP-M8FKLMRL: ~$ pidof sleep
15097
fawad@LAPTOP-M8FKLMRL: ~$ |
```

Kill command is used to

```
fawad@LAPTOP-M8FKLMRL: ~$ sleep 25 &
[1] 15307
fawad@LAPTOP-M8FKLMRL: ~$ kill 15307
-bash: kill: (15307) - No such process
fawad@LAPTOP-M8FKLMRL: ~$ kill 15307
fawad@LAPTOP-M8FKLMRL: ~$ jobs
[1]+  Terminated                  sleep 25
fawad@LAPTOP-M8FKLMRL: ~$ |
```