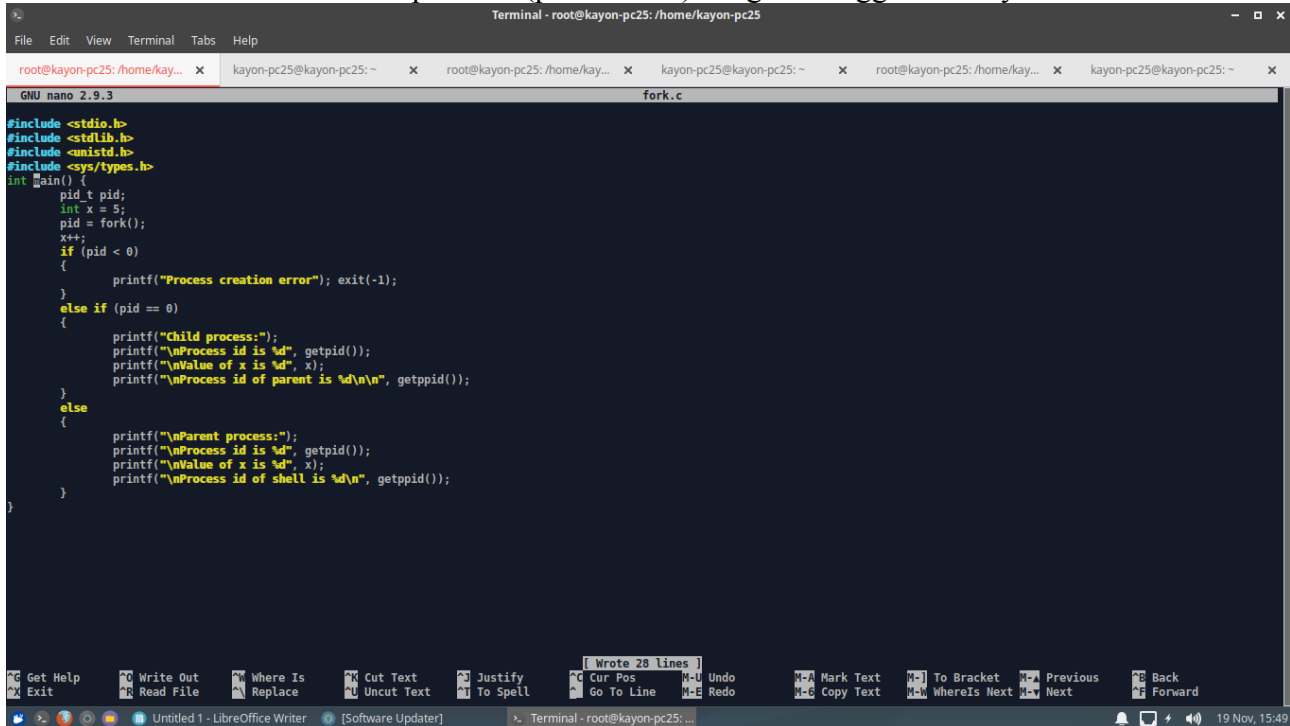


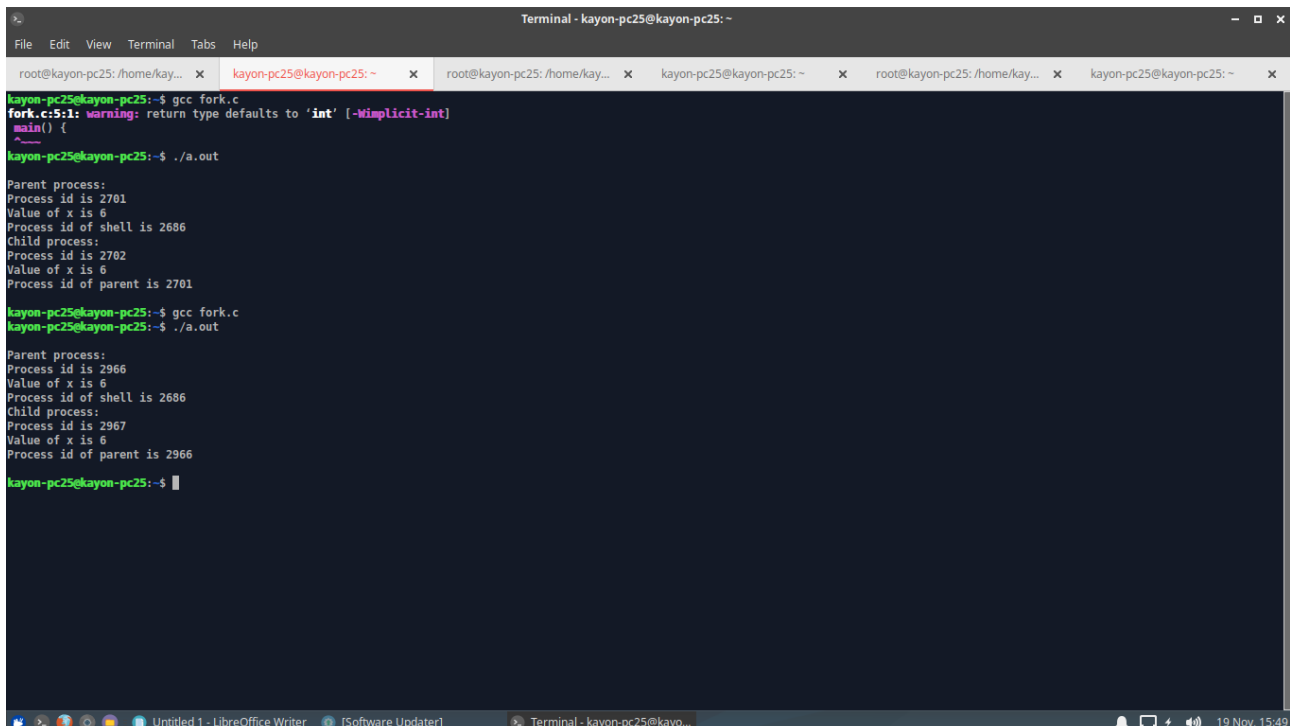
Nama : Nur Fitria Melani
NIM : L200180012
Kelas : A

MODUL 8. System Call

1. Membuat sebuah 'child process' (proses baru) dengan menggunakan system call 'fork'

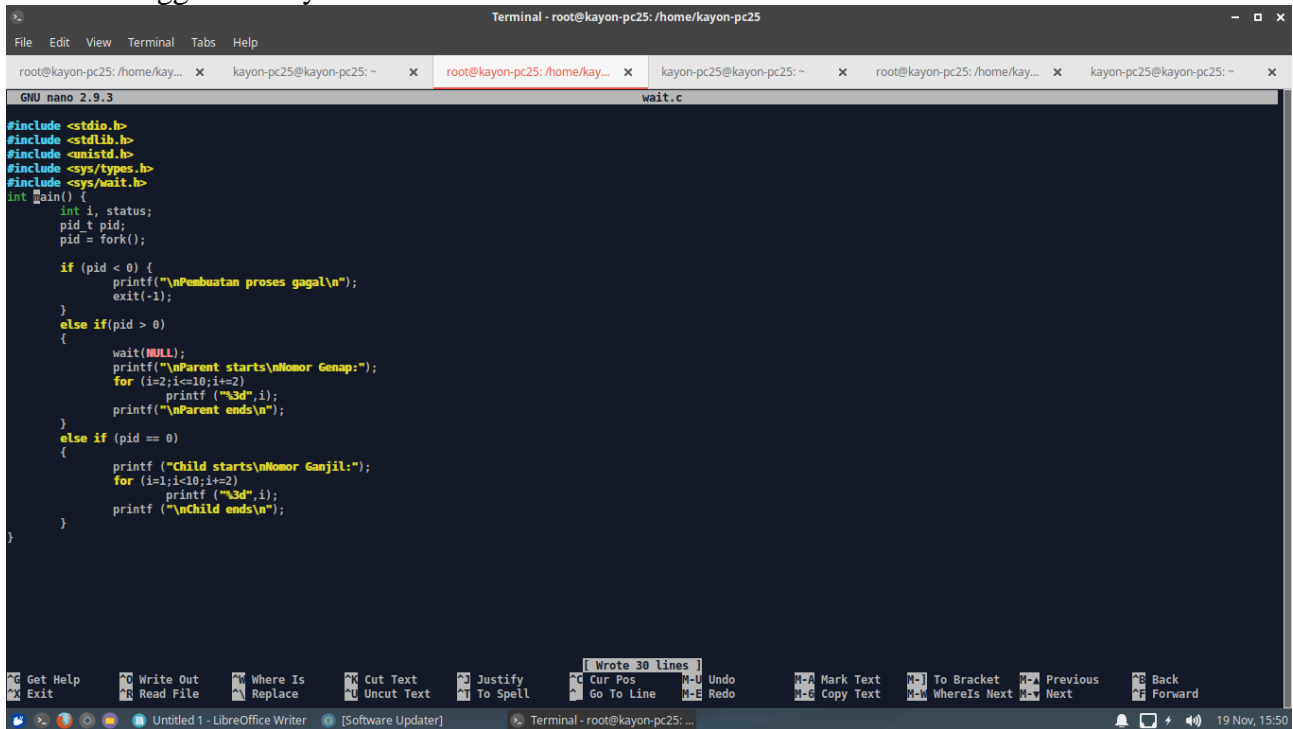


```
GNU nano 2.9.3 fork.c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
int main() {
    pid_t pid;
    int x = 5;
    pid = fork();
    x++;
    if (pid < 0)
    {
        printf("Process creation error"); exit(-1);
    }
    else if (pid == 0)
    {
        printf("Child process:");
        printf("\nProcess id is %d", getpid());
        printf("\nValue of x is %d", x);
        printf("\nProcess id of parent is %d\n\n", getppid());
    }
    else
    {
        printf("\nParent process:");
        printf("\nProcess id is %d", getpid());
        printf("\nValue of x is %d", x);
        printf("\nProcess id of shell is %d\n", getppid());
    }
}
```



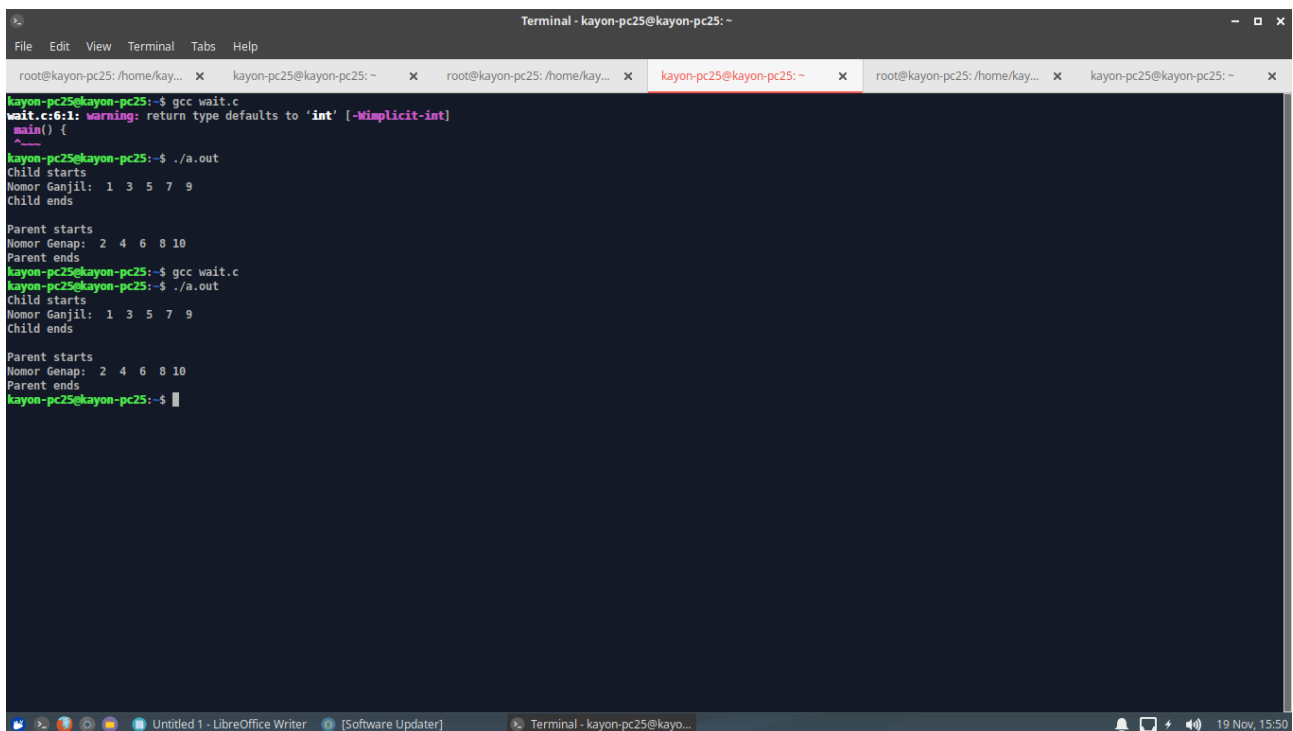
```
kayon-pc25@kayon-pc25:~$ gcc fork.c
fork.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main() {
^
kayon-pc25@kayon-pc25:~$ ./a.out
Parent process:
Process id is 2701
Value of x is 6
Process id of shell is 2686
Child process:
Process id is 2702
Value of x is 6
Process id of parent is 2701
kayon-pc25@kayon-pc25:~$ gcc fork.c
kayon-pc25@kayon-pc25:~$ ./a.out
Parent process:
Process id is 2966
Value of x is 6
Process id of shell is 2686
Child process:
Process id is 2967
Value of x is 6
Process id of parent is 2966
kayon-pc25@kayon-pc25:~$
```

2. Menghentikan sementara(block) proses parent sampai dengan proses child selesai, menggunakan system call 'wait'.



```
GNU nano 2.9.3 wait.c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>
int main() {
    int i, status;
    pid_t pid;
    pid = fork();

    if (pid < 0) {
        printf("\nPembuatan proses gagal\n");
        exit(-1);
    }
    else if (pid > 0) {
        wait(NULL);
        printf("\nParent starts\nNomor Genap:");
        for (i=2; i<=10; i+=2)
            printf(" %3d", i);
        printf("\nParent ends\n");
    }
    else if (pid == 0) {
        printf("\nChild starts\nNomor Ganjil:");
        for (i=1; i<=10; i+=2)
            printf(" %3d", i);
        printf("\nChild ends\n");
    }
}
```



```
kayon-pc25@kayon-pc25:~$ gcc wait.c
wait.c:6:1: warning: return type defaults to 'int' [-Wimplicit-int]
main() {
^
kayon-pc25@kayon-pc25:~$ ./a.out
Child starts
Nomor Ganjil: 1 3 5 7 9
Child ends

Parent starts
Nomor Genap: 2 4 6 8 10
Parent ends
kayon-pc25@kayon-pc25:~$ gcc wait.c
kayon-pc25@kayon-pc25:~$ ./a.out
Child starts
Nomor Ganjil: 1 3 5 7 9
Child ends

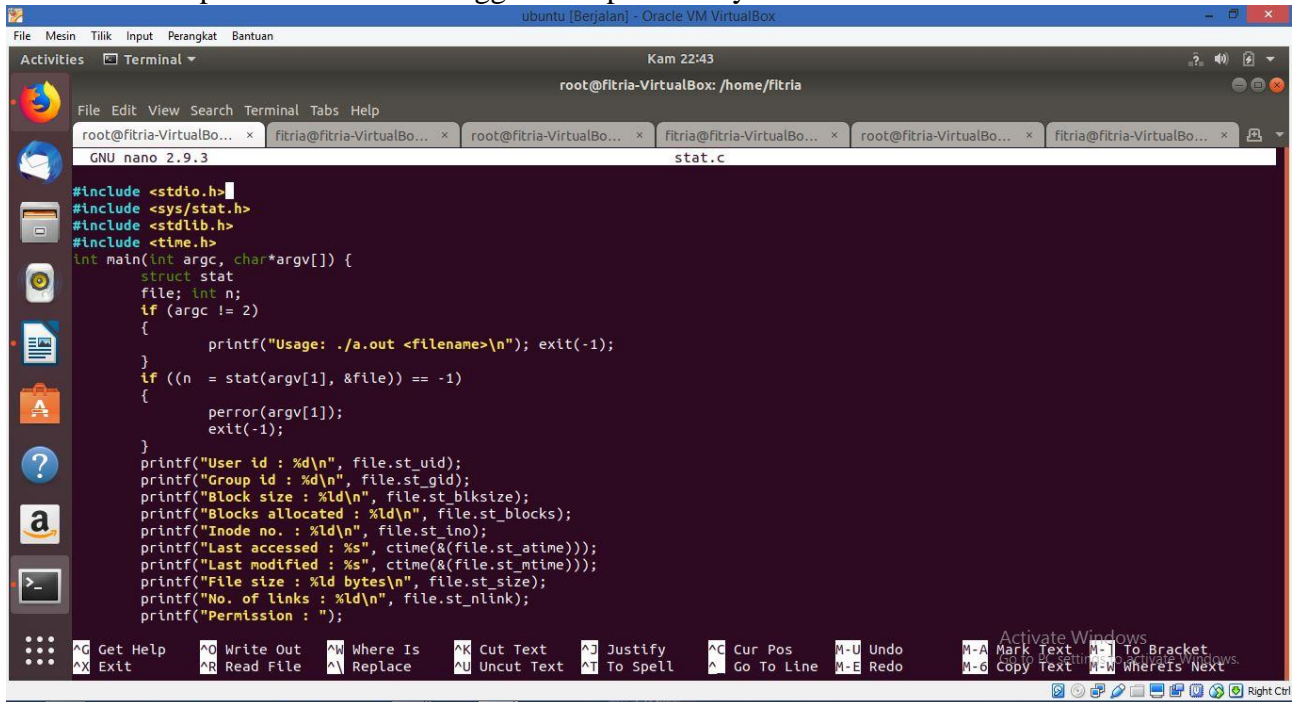
Parent starts
Nomor Genap: 2 4 6 8 10
Parent ends
kayon-pc25@kayon-pc25:~$
```

3. Loading program yang dapat dieksekusi dalam sebuah 'child' proses menggunakan perintah system call 'exec'.

```
Terminal - root@kayon-pc25: /home/kayon-pc25
File Edit View Terminal Tabs Help
root@kayon-pc25: /home/kay... x kayon-pc25@kayon-pc25: ~ x root@kayon-pc25: /home/kay... x kayon-pc25@kayon-pc25: ~ x root@kayon-pc25: /home/kay... x kayon-pc25@kayon-pc25: ~ x
GNU nano 2.9.3 exec.c
#include <stdio.h>
#include <sys/types.h>
#include <unistd.h>
#include <stdlib.h>
#include <sys/wait.h>
int main(int argc, char*argv[]) {
    pid_t pid;
    int i;
    if (argc != 3) {
        printf("\nInsufficient arguments to load program");
        printf("\nUsage: ./a.out <path> <cmd>\n"); exit(-1);
    }
    switch(pid = fork())
    {
        case -1:
            printf("Fork failed");
            exit(-1);
        case 0:
            printf("Child process\n");
            i = execl(argv[1], argv[2], NULL);
            if (i < 0) {
                printf("%s program not loaded using exec system call\n", argv[2]);
                exit(-1);
            }
        default:
            wait(NULL);
            printf("Child Terminated\n");
            exit(-1);
    }
}
```

```
Terminal - kayon-pc25@kayon-pc25: ~
File Edit View Terminal Tabs Help
root@kayon-pc25: /home/kay... x kayon-pc25@kayon-pc25: ~ x root@kayon-pc25: /home/kay... x kayon-pc25@kayon-pc25: ~ x root@kayon-pc25: /home/kay... x kayon-pc25@kayon-pc25: ~ x
kayon-pc25@kayon-pc25:~$ gcc exec.c
exec.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main(int argc, char*argv[]) {
^
exec.c: In function 'main':
exec.c:23:3: warning: missing sentinel in function call [-Wformat=]
    i = execl(argv[1], argv[2], 0);
    ^
exec.c:30:3: warning: implicit declaration of function 'wait'; did you mean 'main'? [-Wimplicit-function-declaration]
    wait(NULL);
    ^
main
kayon-pc25@kayon-pc25:~$ ./a.out /bin/ls ls
Child process
a.out Desktop Documents Downloads exec.c fork.c info1200180110.sh.save info1200180110.sh.save.1 Music Pictures Public Templates Videos wait.c
Child Terminated
kayon-pc25@kayon-pc25:~$ gcc exec.c
exec.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main(int argc, char*argv[]) {
^
exec.c: In function 'main':
exec.c:20:3: warning: missing sentinel in function call [-Wformat=]
    i = execl(argv[1], argv[2], 0);
    ^
exec.c:27:3: warning: implicit declaration of function 'wait'; did you mean 'main'? [-Wimplicit-function-declaration]
    wait(NULL);
    ^
main
kayon-pc25@kayon-pc25:~$ gcc exec.c
exec.c:5:10: fatal error: sys/wait.c: No such file or directory
#include <sys/wait.c>
         ^
compilation terminated.
kayon-pc25@kayon-pc25:~$ gcc exec.c
exec.c:6:1: warning: return type defaults to 'int' [-Wimplicit-int]
main(int argc, char*argv[]) {
^
kayon-pc25@kayon-pc25:~$ gcc exec.c
kayon-pc25@kayon-pc25:~$ ./a.out /bin/ls ls
Child process
a.out Desktop Documents Downloads exec.c fork.c info1200180110.sh.save info1200180110.sh.save.1 Music Pictures Public Templates Videos wait.c
Child Terminated
kayon-pc25@kayon-pc25:~$
```

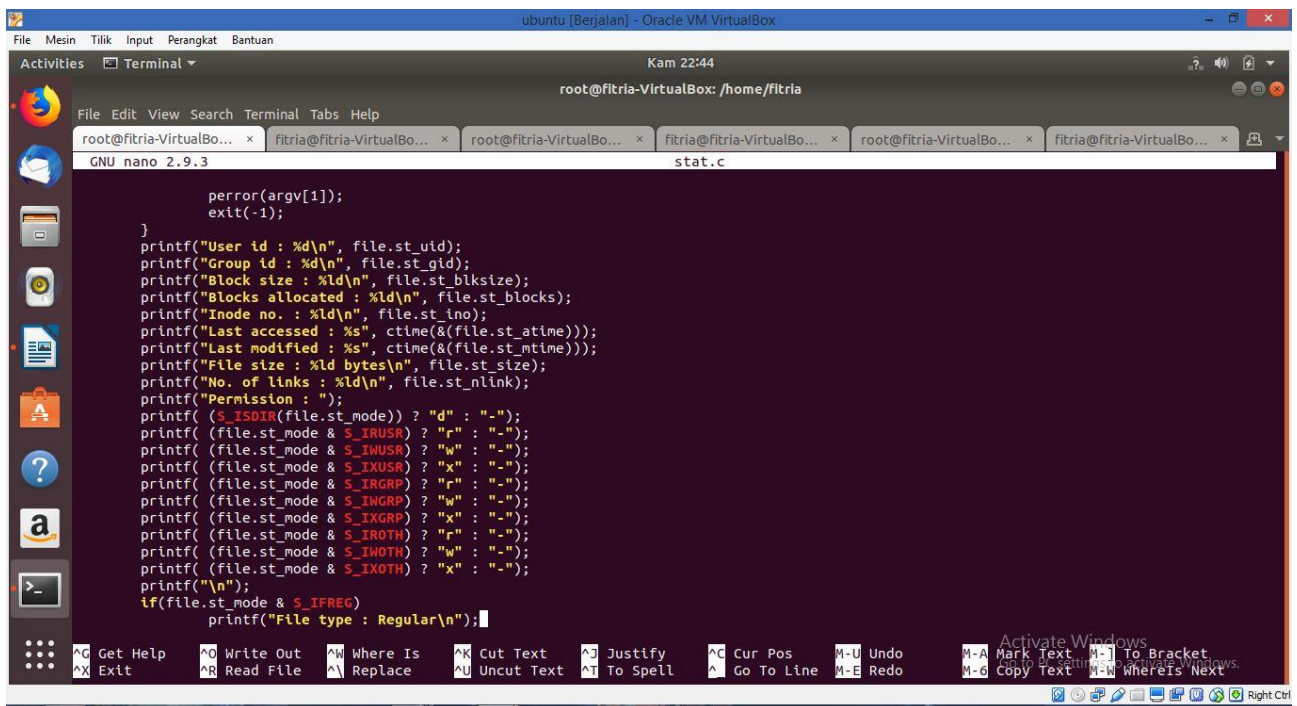
4. Menampilkan status file menggunakan perintah system call 'stat'



```
root@fitria-VirtualBox: /home/fitria
GNU nano 2.9.3 stat.c

#include <stdio.h>
#include <sys/stat.h>
#include <stdlib.h>
#include <time.h>

int main(int argc, char*argv[]) {
    struct stat
    file; int n;
    if (argc != 2)
    {
        printf("Usage: ./a.out <filename>\n"); exit(-1);
    }
    if ((n = stat(argv[1], &file)) == -1)
    {
        perror(argv[1]);
        exit(-1);
    }
    printf("User id : %d\n", file.st_uid);
    printf("Group id : %d\n", file.st_gid);
    printf("Block size : %ld\n", file.st_blksize);
    printf("Blocks allocated : %ld\n", file.st_blocks);
    printf("Inode no. : %ld\n", file.st_ino);
    printf("Last accessed : %s", ctime(&(file.st_atime)));
    printf("Last modified : %s", ctime(&(file.st_mtime)));
    printf("File size : %ld bytes\n", file.st_size);
    printf("No. of links : %ld\n", file.st_nlink);
    printf("Permission : ");
```



```
        perror(argv[1]);
        exit(-1);
    }
    printf("User id : %d\n", file.st_uid);
    printf("Group id : %d\n", file.st_gid);
    printf("Block size : %ld\n", file.st_blksize);
    printf("Blocks allocated : %ld\n", file.st_blocks);
    printf("Inode no. : %ld\n", file.st_ino);
    printf("Last accessed : %s", ctime(&(file.st_atime)));
    printf("Last modified : %s", ctime(&(file.st_mtime)));
    printf("File size : %ld bytes\n", file.st_size);
    printf("No. of links : %ld\n", file.st_nlink);
    printf("Permission : ");
    printf( (S_ISDIR(file.st_mode)) ? "d" : "-");
    printf( (file.st_mode & S_IRUSR) ? "r" : "-");
    printf( (file.st_mode & S_IWUSR) ? "w" : "-");
    printf( (file.st_mode & S_IXUSR) ? "x" : "-");
    printf( (file.st_mode & S_IRGRP) ? "r" : "-");
    printf( (file.st_mode & S_IWGRP) ? "w" : "-");
    printf( (file.st_mode & S_IXGRP) ? "x" : "-");
    printf( (file.st_mode & S_IROTH) ? "r" : "-");
    printf( (file.st_mode & S_IWOTH) ? "w" : "-");
    printf( (file.st_mode & S_IXOTH) ? "x" : "-");
    printf("\n");
    if(file.st_mode & S_IFREG)
        printf("File type : Regular\n");
```

ubuntu [Berjalan] - Oracle VM VirtualBox

File Mesin Tilik Input Perangkat Bantuan

Activities Terminal

Kam 22:44

root@fitria-VirtualBox: /home/fitria

File Edit View Search Terminal Tabs Help

root@fitria-VirtualBo... x fitria@fitria-VirtualBo... x root@fitria-VirtualBo... x fitria@fitria-VirtualBo... x root@fitria-VirtualBo... x fitria@fitria-VirtualBo... x

GNU nano 2.9.3 stat.c

```
printf( (S_ISDIR(file.st_mode)) ? "d" : "-");
printf( (file.st_mode & S_IRUSR) ? "r" : "-");
printf( (file.st_mode & S_IWUSR) ? "w" : "-");
printf( (file.st_mode & S_IXUSR) ? "x" : "-");
printf( (file.st_mode & S_IRGRP) ? "r" : "-");
printf( (file.st_mode & S_IWGRP) ? "w" : "-");
printf( (file.st_mode & S_IXGRP) ? "x" : "-");
printf( (file.st_mode & S_IROTH) ? "r" : "-");
printf( (file.st_mode & S_IWOTH) ? "w" : "-");
printf( (file.st_mode & S_IXOTH) ? "x" : "-");
printf("\n");
if(file.st_mode & S_IFREG)
    printf("File type : Regular\n");
if(file.st_mode & S_IFDIR)
    printf("File type : Directory\n");
}
```

Get Help Write Out Where Is Cut Text Justify Cur Pos M-U Undo M-A Mark Text M-E To Bracket M-X Exit M-R Read File M-W Replace M-U Uncut Text M-T To Spell M-G Go To Line M-E Redo M-A Mark Text M-E To Bracket M-X Copy Text M-W Where Is Next

Activate Windows
Go to PC settings to activate Windows.

ubuntu [Berjalan] - Oracle VM VirtualBox

File Mesin Tilik Input Perangkat Bantuan

Activities Terminal

Kam 22:45

fitria@fitria-VirtualBox: ~

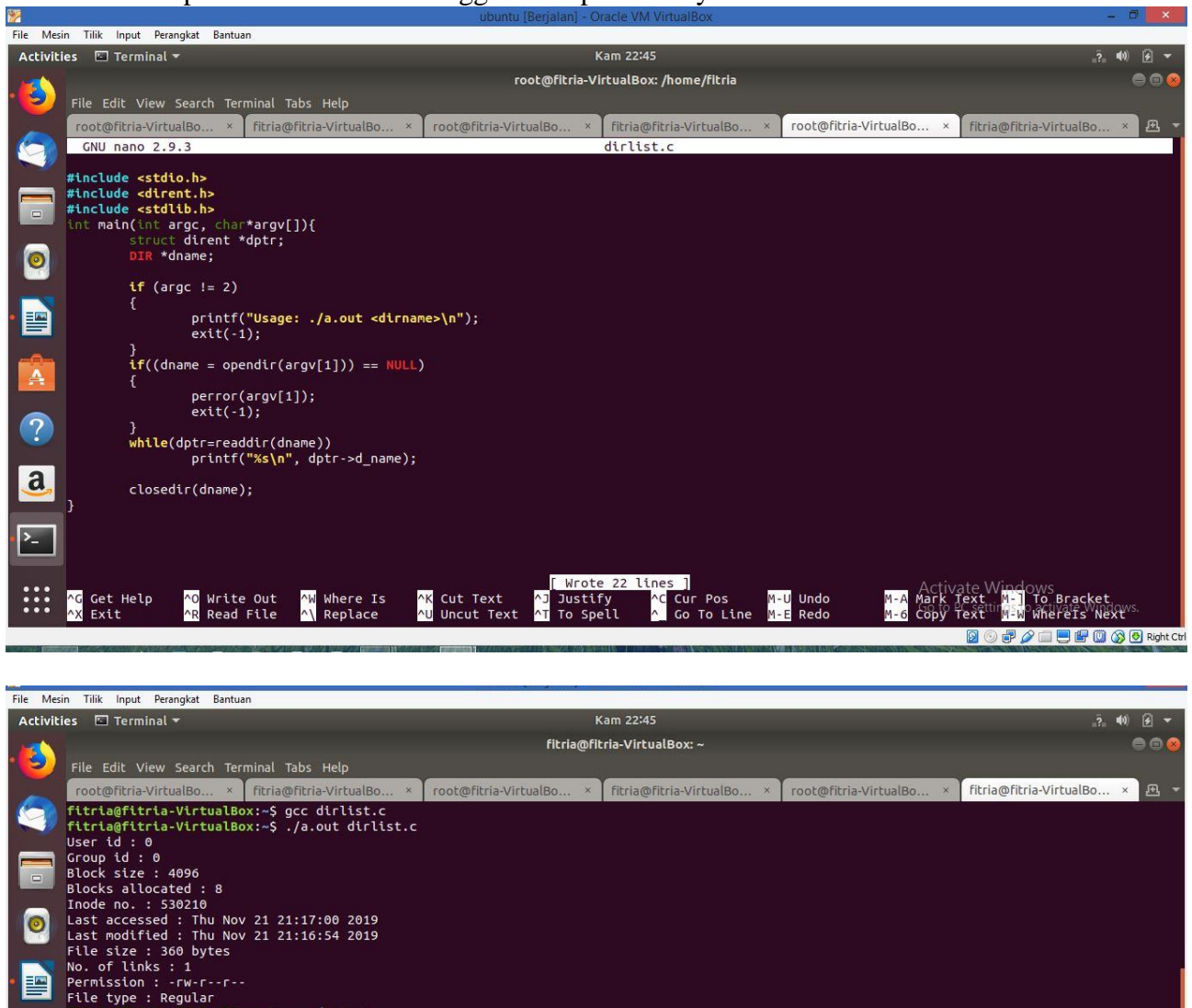
File Edit View Search Terminal Tabs Help

root@fitria-VirtualBo... x fitria@fitria-VirtualBo... x root@fitria-VirtualBo... x fitria@fitria-VirtualBo... x root@fitria-VirtualBo... x fitria@fitria-VirtualBo... x

```
File type : Regular
fitria@fitria-VirtualBox:~$ gcc stat.c
fitria@fitria-VirtualBox:~$ ./a.out
Usage: ./a.out <filename>
fitria@fitria-VirtualBox:~$ gcc stat.c
fitria@fitria-VirtualBox:~$ ./a.out stat.c
User id : 0
Group id : 0
Block size : 4096
Blocks allocated : 8
Inode no. : 555318
Last accessed : Thu Nov 21 21:09:24 2019
Last modified : Thu Nov 21 21:09:16 2019
File size : 1375 bytes
No. of links : 1
Permission : -rw-r--r--
File type : Regular
fitria@fitria-VirtualBox:~$ gcc stat.c
fitria@fitria-VirtualBox:~$ ./a.out stat.c
User id : 0
Group id : 0
Block size : 4096
Blocks allocated : 8
Inode no. : 555318
Last accessed : Thu Nov 21 21:09:24 2019
Last modified : Thu Nov 21 21:09:16 2019
File size : 1375 bytes
No. of links : 1
Permission : -rw-r--r--
File type : Regular
fitria@fitria-VirtualBox:~$
```

Activate Windows
Go to PC settings to activate Windows.

5. Menampilkan isi direktori menggunakan perintah system call 'readdir'



The image shows two screenshots of a terminal window in an Oracle VM VirtualBox environment. The top screenshot shows the source code of a C program named `dirlist.c` being edited in the `nano` text editor. The code uses the `readdir` system call to list the contents of a directory. The bottom screenshot shows the terminal output after compiling the program with `gcc` and running it with `./a.out`. The output displays file statistics for the current directory, including user ID, group ID, block size, blocks allocated, inode number, last accessed and modified times, file size, number of links, permissions, and file type.

```
root@fitria-VirtualBox: /home/fitria
GNU nano 2.9.3 dirlist.c

#include <stdio.h>
#include <dirent.h>
#include <stdlib.h>
int main(int argc, char*argv[]){
    struct dirent *dptr;
    DIR *dname;

    if (argc != 2)
    {
        printf("Usage: ./a.out <dirname>\n");
        exit(-1);
    }
    if((dname = opendir(argv[1])) == NULL)
    {
        perror(argv[1]);
        exit(-1);
    }
    while(dptr=readdir(dname))
        printf("%s\n", dptr->d_name);

    closedir(dname);
}
```

```
fitria@fitria-VirtualBox:~$ gcc dirlist.c
fitria@fitria-VirtualBox:~$ ./a.out dirlist.c
User id : 0
Group id : 0
Block size : 4096
Blocks allocated : 8
Inode no. : 530210
Last accessed : Thu Nov 21 21:17:00 2019
Last modified : Thu Nov 21 21:16:54 2019
File size : 360 bytes
No. of links : 1
Permission : -rw-r--r--
File type : Regular
```