

PRAKTIKUM SISTEM OPERASI

MODUL 8: SYSTEM CALL



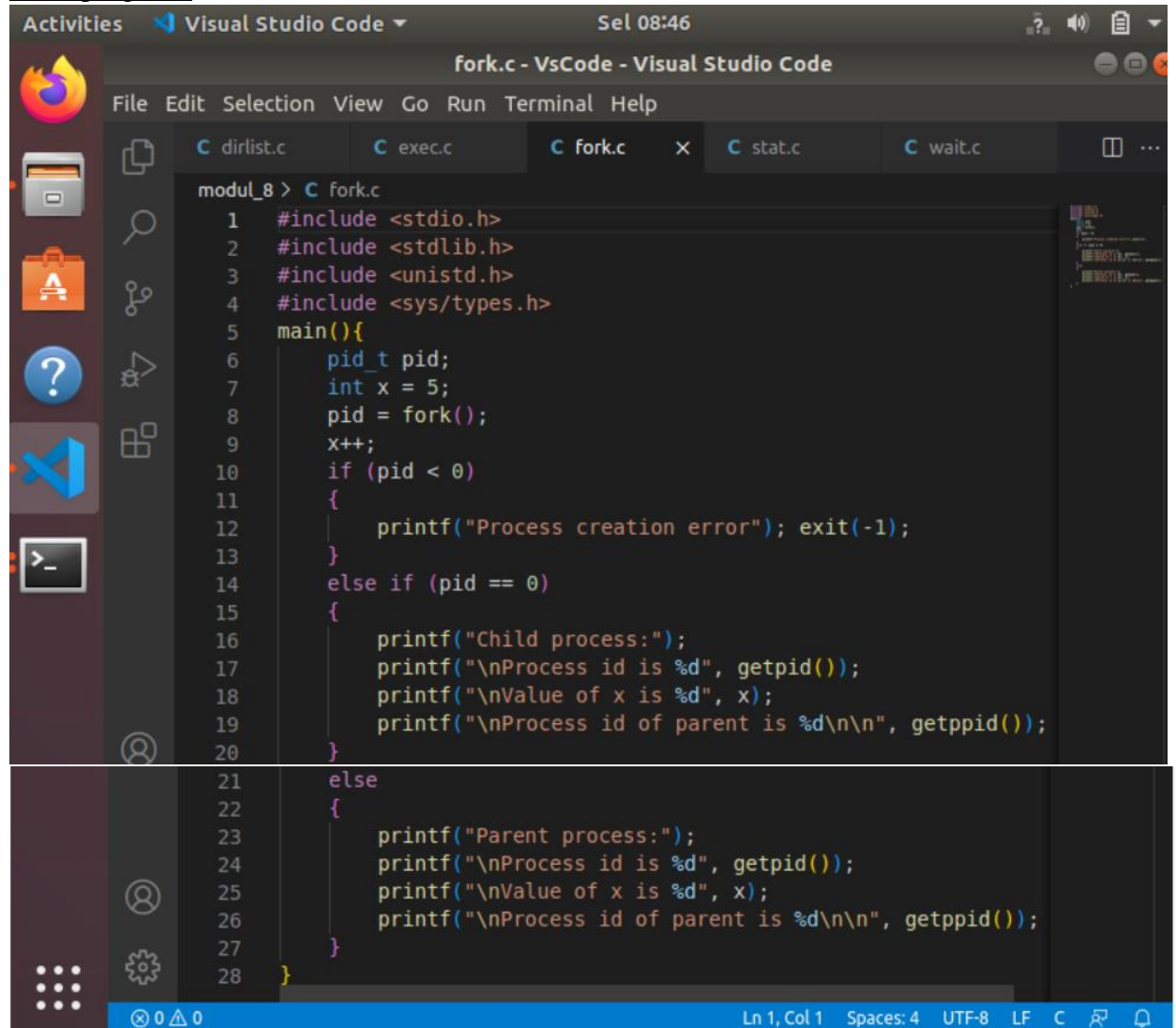
Penyusun:

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Kelas : E
Mata Kuliah : Praktikum Sistem Operasi
Program Studi : Informatika

PROGRAM STUDI TEKNIK INFORMATIKA
FAKULTAS KOMUNIKASI DAN INFORMATIKA
UNIVERSITAS MUHAMMADIYAH SURAKARTA 2022

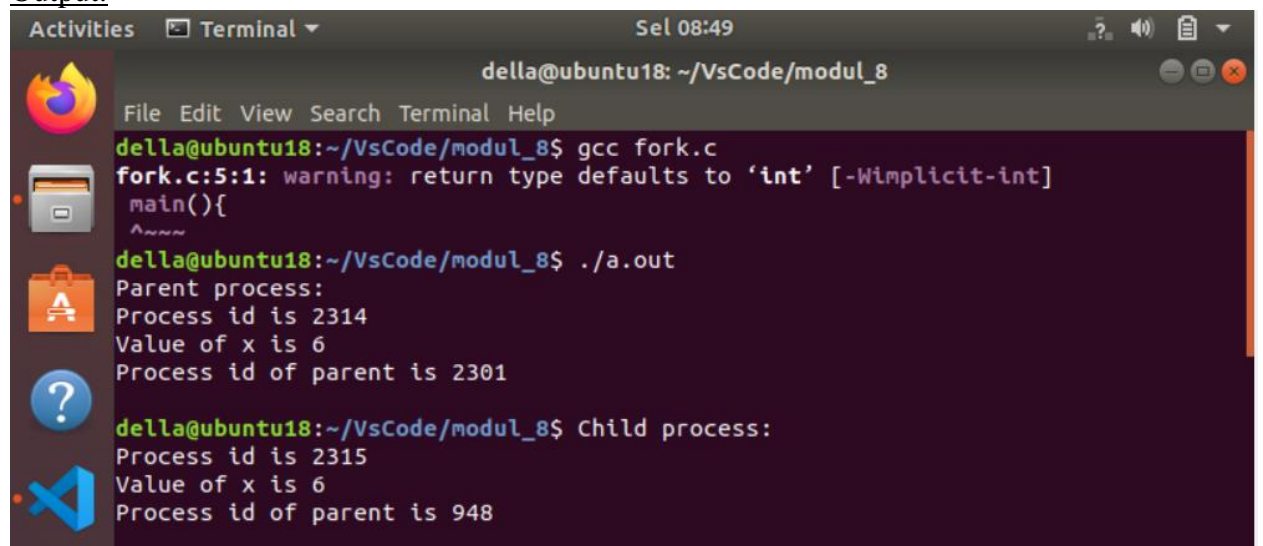
1. Membuat sebuah 'child process' (proses baru) dengan menggunakan system call 'fork'

Kode program:



```
modul_8 > C fork.c
1  #include <stdio.h>
2  #include <stdlib.h>
3  #include <unistd.h>
4  #include <sys/types.h>
5  main(){
6      pid_t pid;
7      int x = 5;
8      pid = fork();
9      x++;
10     if (pid < 0)
11     {
12         printf("Process creation error"); exit(-1);
13     }
14     else if (pid == 0)
15     {
16         printf("Child process:");
17         printf("\nProcess id is %d", getpid());
18         printf("\nValue of x is %d", x);
19         printf("\nProcess id of parent is %d\n\n", getppid());
20     }
21     else
22     {
23         printf("Parent process:");
24         printf("\nProcess id is %d", getpid());
25         printf("\nValue of x is %d", x);
26         printf("\nProcess id of parent is %d\n\n", getppid());
27     }
28 }
```

Output:

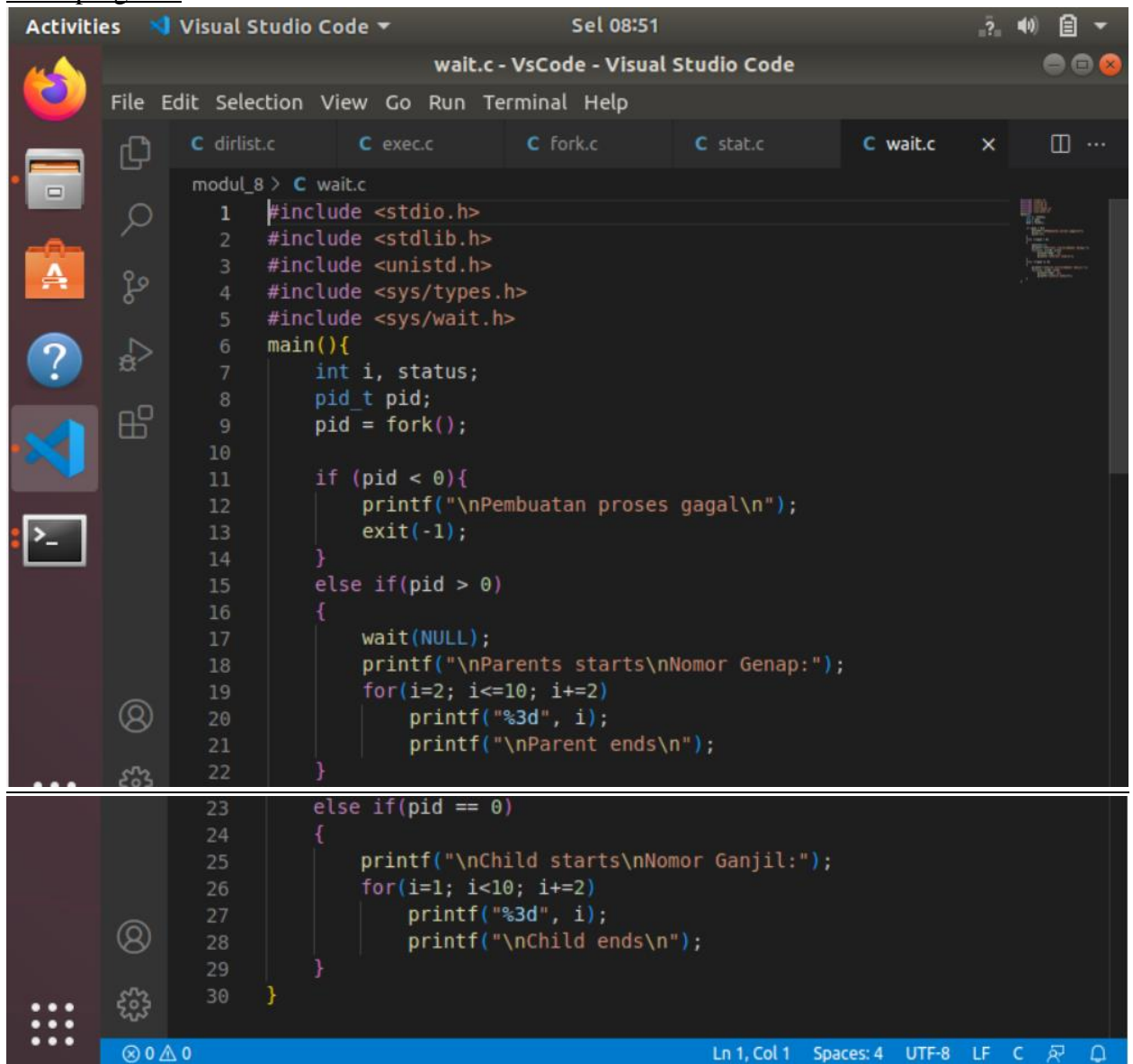


```
Activities Terminal
della@ubuntu18: ~/VsCode/modul_8
File Edit View Search Terminal Help
della@ubuntu18:~/VsCode/modul_8$ gcc fork.c
fork.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main(){
della@ubuntu18:~/VsCode/modul_8$ ./a.out
Parent process:
Process id is 2314
Value of x is 6
Process id of parent is 2301

della@ubuntu18:~/VsCode/modul_8$ Child process:
Process id is 2315
Value of x is 6
Process id of parent is 948
```

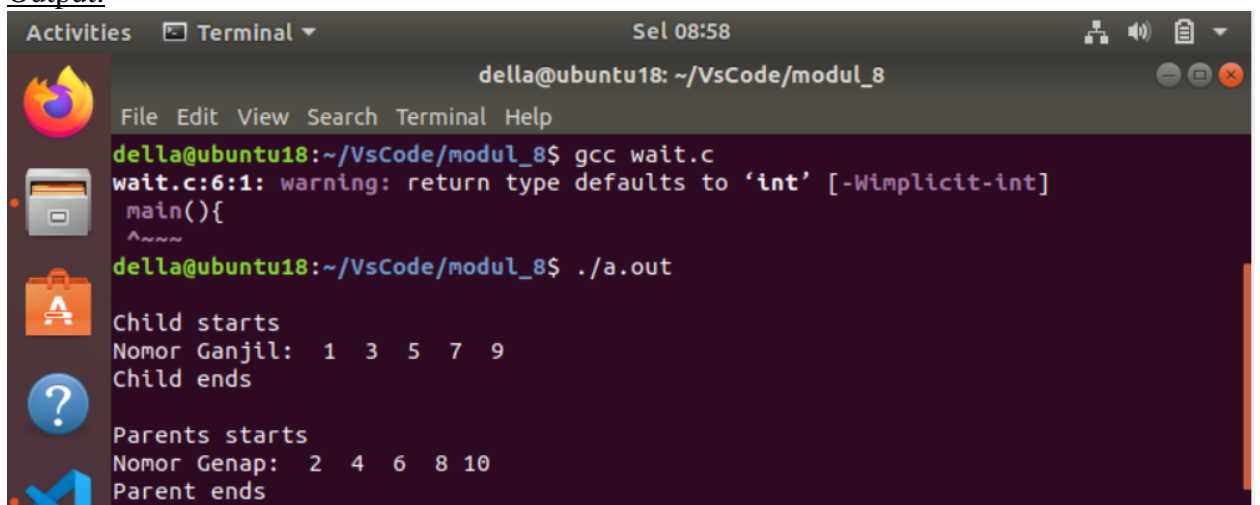
2. Menghentikan sementara (block) proses parent sampai dengan proses child selesai, menggunakan perintah system call 'wait'

Kode program:



```
modul_8 > C wait.c
1  #include <stdio.h>
2  #include <stdlib.h>
3  #include <unistd.h>
4  #include <sys/types.h>
5  #include <sys/wait.h>
6  main(){
7      int i, status;
8      pid_t pid;
9      pid = fork();
10
11     if (pid < 0){
12         printf("\nPembuatan proses gagal\n");
13         exit(-1);
14     }
15     else if(pid > 0)
16     {
17         wait(NULL);
18         printf("\nParents starts\nNomor Genap:");
19         for(i=2; i<=10; i+=2)
20             printf("%3d", i);
21         printf("\nParent ends\n");
22     }
23
24     else if(pid == 0)
25     {
26         printf("\nChild starts\nNomor Ganjil:");
27         for(i=1; i<=10; i+=2)
28             printf("%3d", i);
29         printf("\nChild ends\n");
30     }
}
```

Output:



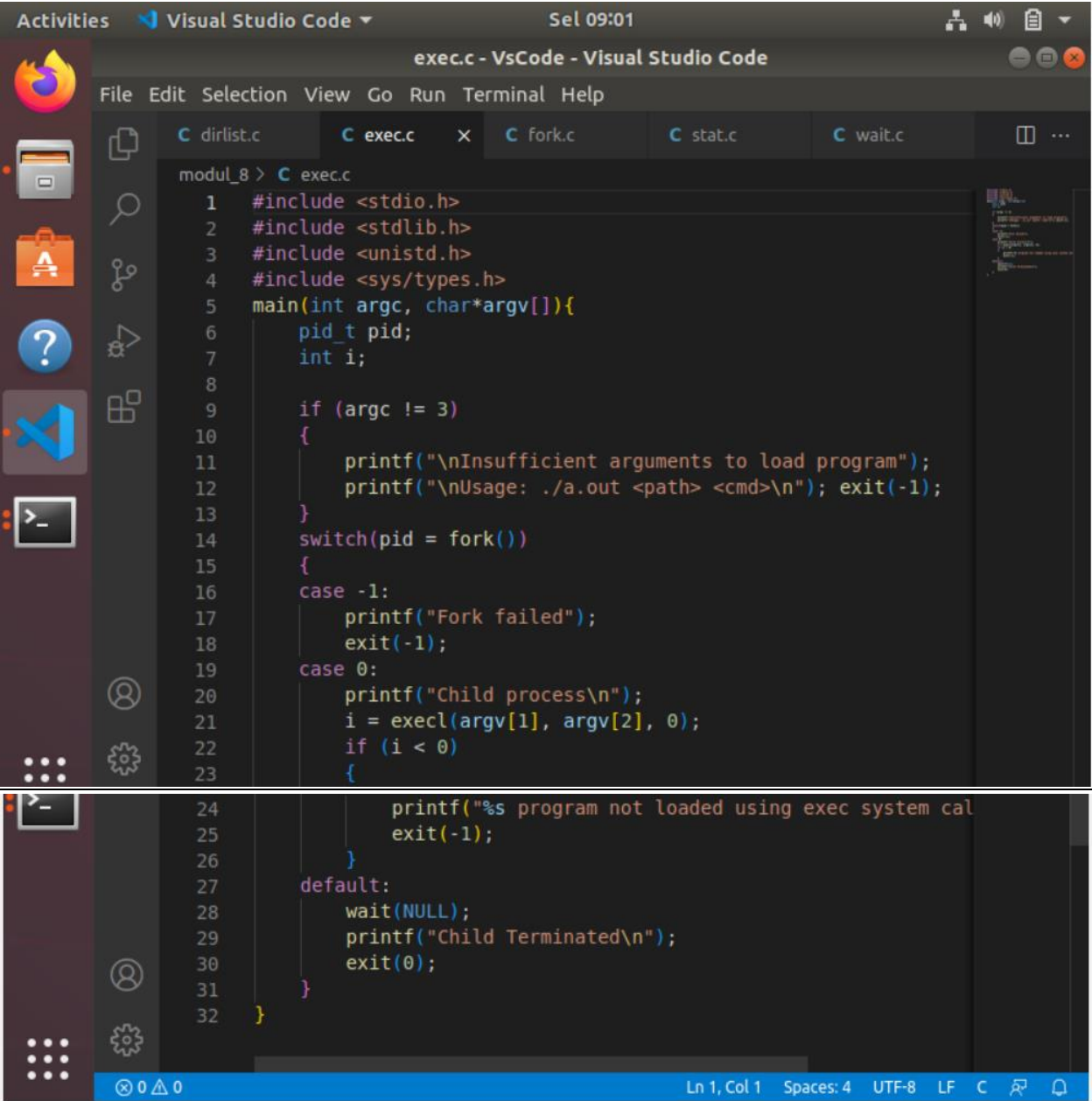
```
Activities Terminal
della@ubuntu18: ~/VsCode/modul_8
File Edit View Search Terminal Help
della@ubuntu18:~/VsCode/modul_8$ gcc wait.c
wait.c:6:1: warning: return type defaults to 'int' [-Wimplicit-int]
main(){
~~~~~
della@ubuntu18:~/VsCode/modul_8$ ./a.out

Child starts
Nomor Ganjil:  1  3  5  7  9
Child ends

Parents starts
Nomor Genap:  2  4  6  8 10
Parent ends
```

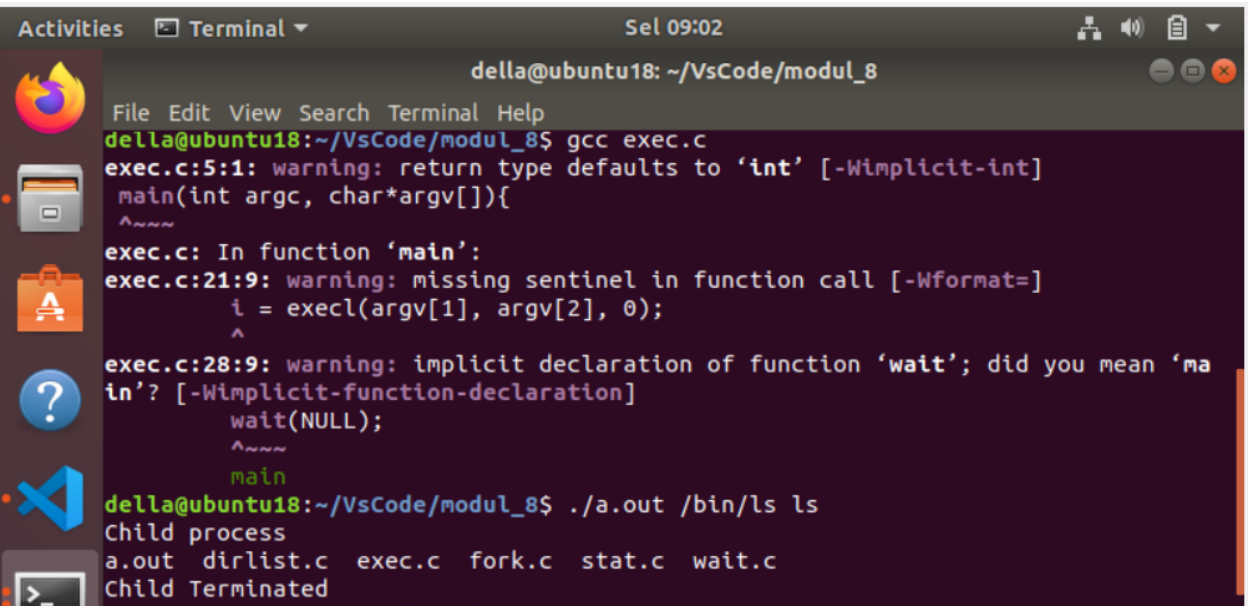
3. Loading program yang dapat di eksekusi dalam sebuah ‘child’ proses menggunakan perintah system call ‘exec’

Kode program:



```
modul_8 > C exec.c
1  #include <stdio.h>
2  #include <stdlib.h>
3  #include <unistd.h>
4  #include <sys/types.h>
5  main(int argc, char*argv[]){
6      pid_t pid;
7      int i;
8
9      if (argc != 3)
10     {
11         printf("\nInsufficient arguments to load program");
12         printf("\nUsage: ./a.out <path> <cmd>\n"); exit(-1);
13     }
14     switch(pid = fork())
15     {
16     case -1:
17         printf("Fork failed");
18         exit(-1);
19     case 0:
20         printf("Child process\n");
21         i = execl(argv[1], argv[2], 0);
22         if (i < 0)
23         {
24             printf("%s program not loaded using exec system cal
25             exit(-1);
26         }
27         default:
28             wait(NULL);
29             printf("Child Terminated\n");
30             exit(0);
31     }
32 }
```

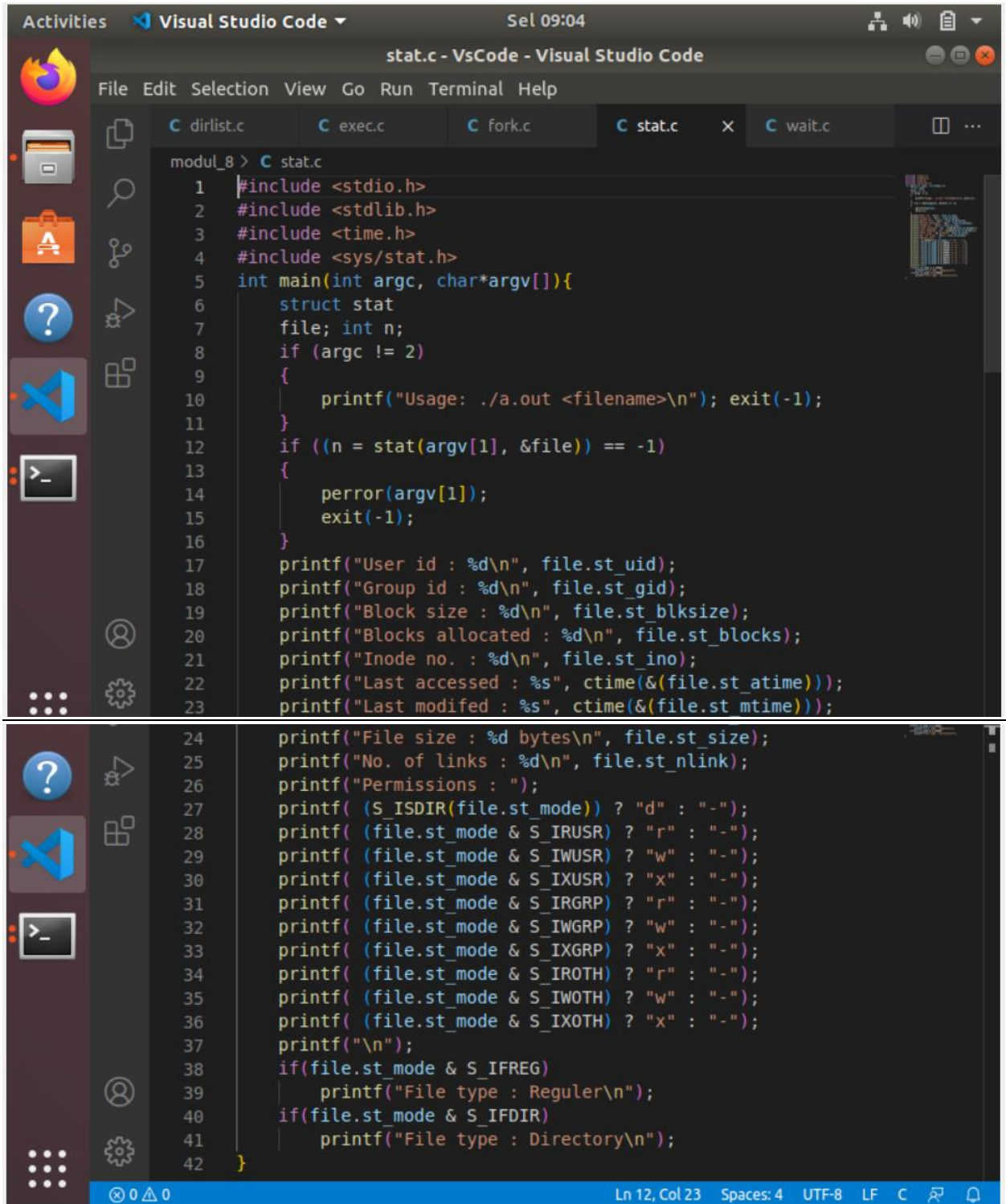
Output:



```
della@ubuntu18: ~/VsCode/modul_8
File Edit View Search Terminal Help
della@ubuntu18:~/VsCode/modul_8$ 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:21:9: warning: missing sentinel in function call [-Wformat=]
    i = execl(argv[1], argv[2], 0);
    ^
exec.c:28:9: warning: implicit declaration of function 'wait'; did you mean 'main'? [-Wimplicit-function-declaration]
    wait(NULL);
    ~~~~
main
della@ubuntu18:~/VsCode/modul_8$ ./a.out /bin/ls ls
Child process
a.out dirlist.c exec.c fork.c stat.c wait.c
Child Terminated
```


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

Kode program:



```
stat.c - VsCode - Visual Studio Code
File Edit Selection View Go Run Terminal Help
C dirlist.c C exec.c C fork.c C stat.c X C wait.c
modul_8 > C stat.c
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <time.h>
4 #include <sys/stat.h>
5 int main(int argc, char*argv[]){
6     struct stat
7     file; int n;
8     if (argc != 2)
9     {
10         printf("Usage: ./a.out <filename>\n"); exit(-1);
11     }
12     if ((n = stat(argv[1], &file)) == -1)
13     {
14         perror(argv[1]);
15         exit(-1);
16     }
17     printf("User id : %d\n", file.st_uid);
18     printf("Group id : %d\n", file.st_gid);
19     printf("Block size : %d\n", file.st_blksize);
20     printf("Blocks allocated : %d\n", file.st_blocks);
21     printf("Inode no. : %d\n", file.st_ino);
22     printf("Last accessed : %s", ctime(&(file.st_atime)));
23     printf("Last modified : %s", ctime(&(file.st_mtime)));
24     printf("File size : %d bytes\n", file.st_size);
25     printf("No. of links : %d\n", file.st_nlink);
26     printf("Permissions : ");
27     printf( (S_ISDIR(file.st_mode)) ? "d" : "-");
28     printf( (file.st_mode & S_IRUSR) ? "r" : "-");
29     printf( (file.st_mode & S_IWUSR) ? "w" : "-");
30     printf( (file.st_mode & S_IXUSR) ? "x" : "-");
31     printf( (file.st_mode & S_IRGRP) ? "r" : "-");
32     printf( (file.st_mode & S_IWGRP) ? "w" : "-");
33     printf( (file.st_mode & S_IXGRP) ? "x" : "-");
34     printf( (file.st_mode & S_IROTH) ? "r" : "-");
35     printf( (file.st_mode & S_IWOTH) ? "w" : "-");
36     printf( (file.st_mode & S_IXOTH) ? "x" : "-");
37     printf("\n");
38     if(file.st_mode & S_IFREG)
39         printf("File type : Regular\n");
40     if(file.st_mode & S_IFDIR)
41         printf("File type : Directory\n");
42 }
```

Output:

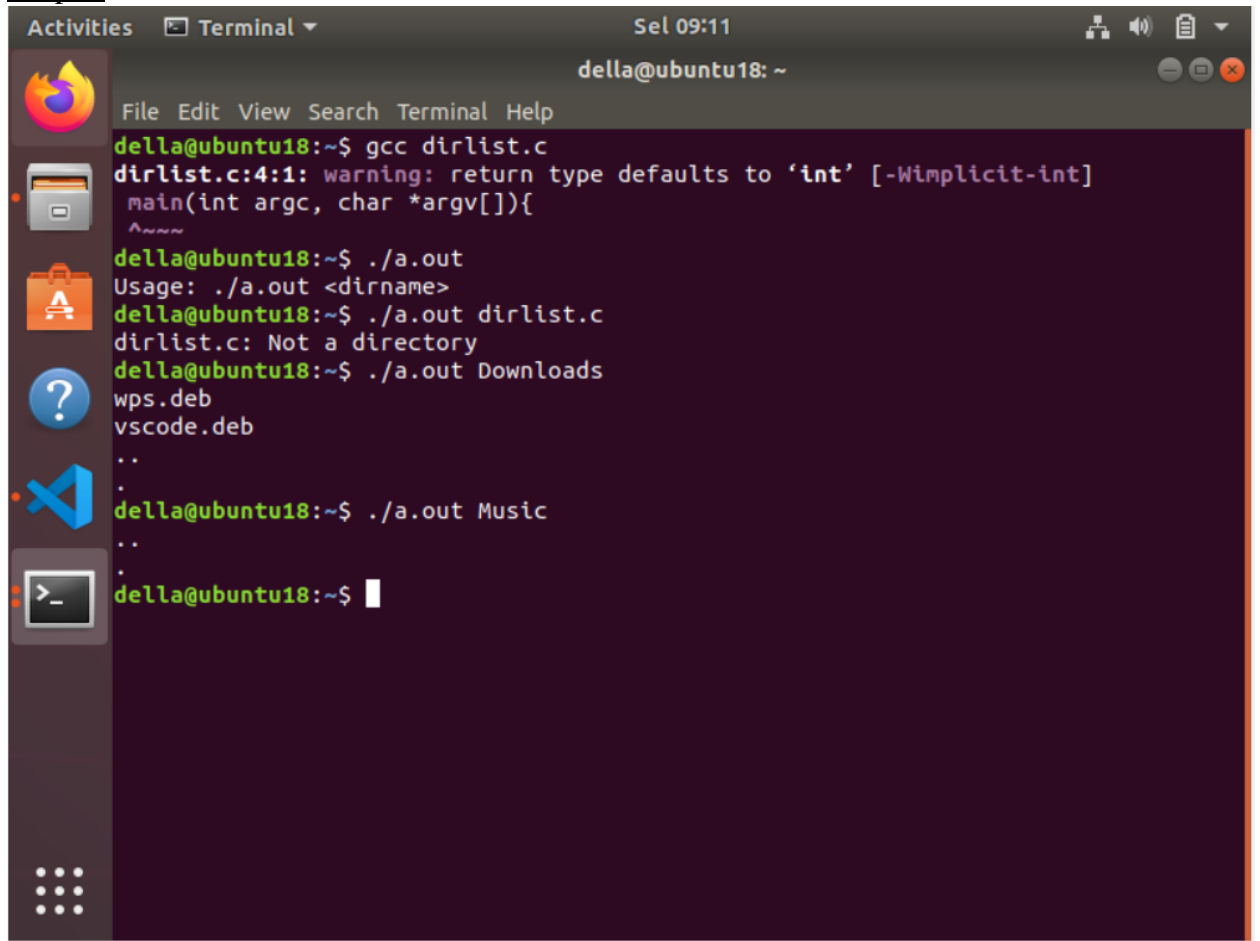
```
Activities Terminal Sel 09:06
della@ubuntu18: ~/VsCode/modul_8
File Edit View Search Terminal Help
della@ubuntu18:~/VsCode/modul_8$ gcc stat.c
stat.c: In function 'main':
stat.c:19:27: warning: format '%d' expects argument of type 'int', but argument
      2 has type '__blksize_t {aka long int}' [-Wformat=]
      printf("Block size : %d\n", file.st_blksize);
                                ~^
                                ~~~~~
                                %ld
stat.c:20:33: warning: format '%d' expects argument of type 'int', but argument
      2 has type '__blkcnt_t {aka long int}' [-Wformat=]
      printf("Blocks allocated : %d\n", file.st_blocks);
                                ~^
                                ~~~~~
                                %ld
stat.c:21:26: warning: format '%d' expects argument of type 'int', but argument
      2 has type '__ino_t {aka long unsigned int}' [-Wformat=]
      printf("Inode no. : %d\n", file.st_ino);
                                ~^
                                ~~~~~
                                %ld
stat.c:24:26: warning: format '%d' expects argument of type 'int', but argument
      2 has type '__off_t {aka long int}' [-Wformat=]
      printf("File size : %d bytes\n", file.st_size);
                                ~^
                                ~~~~~
                                %ld
stat.c:25:29: warning: format '%d' expects argument of type 'int', but argument
      2 has type '__nlink_t {aka long unsigned int}' [-Wformat=]
      printf("No. of links : %d\n", file.st_nlink);
                                ~^
                                ~~~~~
                                %ld

della@ubuntu18:~/VsCode/modul_8$ ./a.out stat.c
User id : 1000
Group id : 1000
Block size : 4096
Blocks allocated : 8
Inode no. : 268959
Last accessed : Tue Dec 6 08:19:24 2022
Last modified : Fri Nov 25 18:19:12 2022
File size : 1490 bytes
No. of links : 1
Permissions : -rw-rw-r--
File type : Regular
della@ubuntu18:~/VsCode/modul_8$
```

5. Menampilkan isi direktori menggunakan perintah system call 'readdir'
- Kode program:

```
Activities Visual Studio Code Sel 09:10
dirlist.c - VsCode - Visual Studio Code
File Edit Selection View Go Run Terminal Help
C dirlist.c x C exec.c C fork.c C stat.c C wait.c
modul_8 > C dirlist.c
1 #include <stdio.h>
2 #include <dirent.h>
3 #include <stdlib.h>
4 main(int argc, char *argv[]){
5     struct dirent *dptr;
6     DIR *dname;
7
8     if (argc != 2)
9     {
10         printf("Usage: ./a.out <dirname>\n");
11         exit(-1);
12     }
13     if ((dname = opendir(argv[1])) == NULL)
14     {
15         perror(argv[1]);
16         exit(-1);
17     }
18     while(dptr=readdir(dname))
19         printf("%s\n", dptr->d_name);
20
21     closedir(dname);
22 }
```

Output:



```
della@ubuntu18: ~  
File Edit View Search Terminal Help  
della@ubuntu18:~$ gcc dirlist.c  
dirlist.c:4:1: warning: return type defaults to 'int' [-Wimplicit-int]  
    main(int argc, char *argv[]){  
    ~~~~~  
della@ubuntu18:~$ ./a.out  
Usage: ./a.out <dirname>  
della@ubuntu18:~$ ./a.out dirlist.c  
dirlist.c: Not a directory  
della@ubuntu18:~$ ./a.out Downloads  
wps.deb  
vscode.deb  
..  
.  
della@ubuntu18:~$ ./a.out Music  
..  
..  
.  
della@ubuntu18:~$
```